SPECIAL REPORT: What's new in snow-fighting techniques?

August 1961

ilway TRACK and STRUCTURES

Brush cutter has 22-ft reach
p. 24

Road-Rail vehicle
ests for rail flaws
p. 26

A Simmons-Boardman TIME-SAVER Publication

Keep Switches Open during winter's worst storms

Q AND C ELECTRIC SNOW MELTERS

Ballast type

Tubular type

Compare the savings in time, money and convenience with Q and C Electric Snow Melters over other methods. Once installed, they can be centrally controlled and ready for immediate action at the first flurry of snow or freezing rain. Attention-free and weather-proof, they surpass all other clearing methods.

BALLAST units are placed in a series, loosely on the ballast under the switch points, close to base of the rail. They are furnished for either 47 or 55 volts, AC or DC, and can be placed on 110, 220, 440 or 660 volt circuits. Each unit consumes 1000 watts, and attains a temperature of 284 degrees in fifteen minutes with a maximum of 650 degrees in approximately an hour.

TUBULAR heaters are quickly and permanently attached to stock rails, between movable point and rail, assuring efficient placement of the heated zone. Heater element is enclosed in seamless stainless steel tubing, with brass terminal housing and moisture-proof fittings. Available for AC or DC. Insulated cable lead ten feet long furnished, unless otherwise requested. Wattage, voltage and length are supplied to your specifications.

Anyway you look at it, Q and C Electric Snow Melters are your dependable, winter-wise solution for snow-free switches.

Plan now . . . drop a line for our brochure giving information necessary for a complete Q and C Electric Snow Melter Installation.

THE ◆ DIVISION

WESTERN RAILROAD SUPPLY COMPANY
2742 West 36th Place • Chicago 32, Illinois
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9078

How the NEW CENTURY SWITCH STAND
cuts your operating costs

The economy feature of the New Century goes far beyond its low initial cost.

EASY TO ADJUST

Ease of switch-point adjustment is a built-in feature of the stand itself. By simply removing or adding a shim or two you increase or decrease the length of throw. The shims are furnished with each stand and stored inside the housing. Much quicker and less expensive than adjustments made at the points!

This adjustment feature, in turn, reduces wear on such switch fittings as throw rods and switch rods, resulting in longer life and further economy.

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When one of the parts finally needs replacing, you'll find that new parts will fit the oldest New Centuries on your lines. And this, despite a number of improvements made in the stand's design over the past fifty years.

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The New Century will outlast several switches, and is easily moved from main line to yard or siding service. It can be readily converted from intermediate to low and back again, according to service requirements. One of our engineers will gladly demonstrate the New Century in full detail. Just get in touch with our nearest office.

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for Strength
. . . Economy
. . . Versatility

BETHLEHEM STEEL

BETHLEHEM STEEL

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LUDINGTON, MICHIGAN

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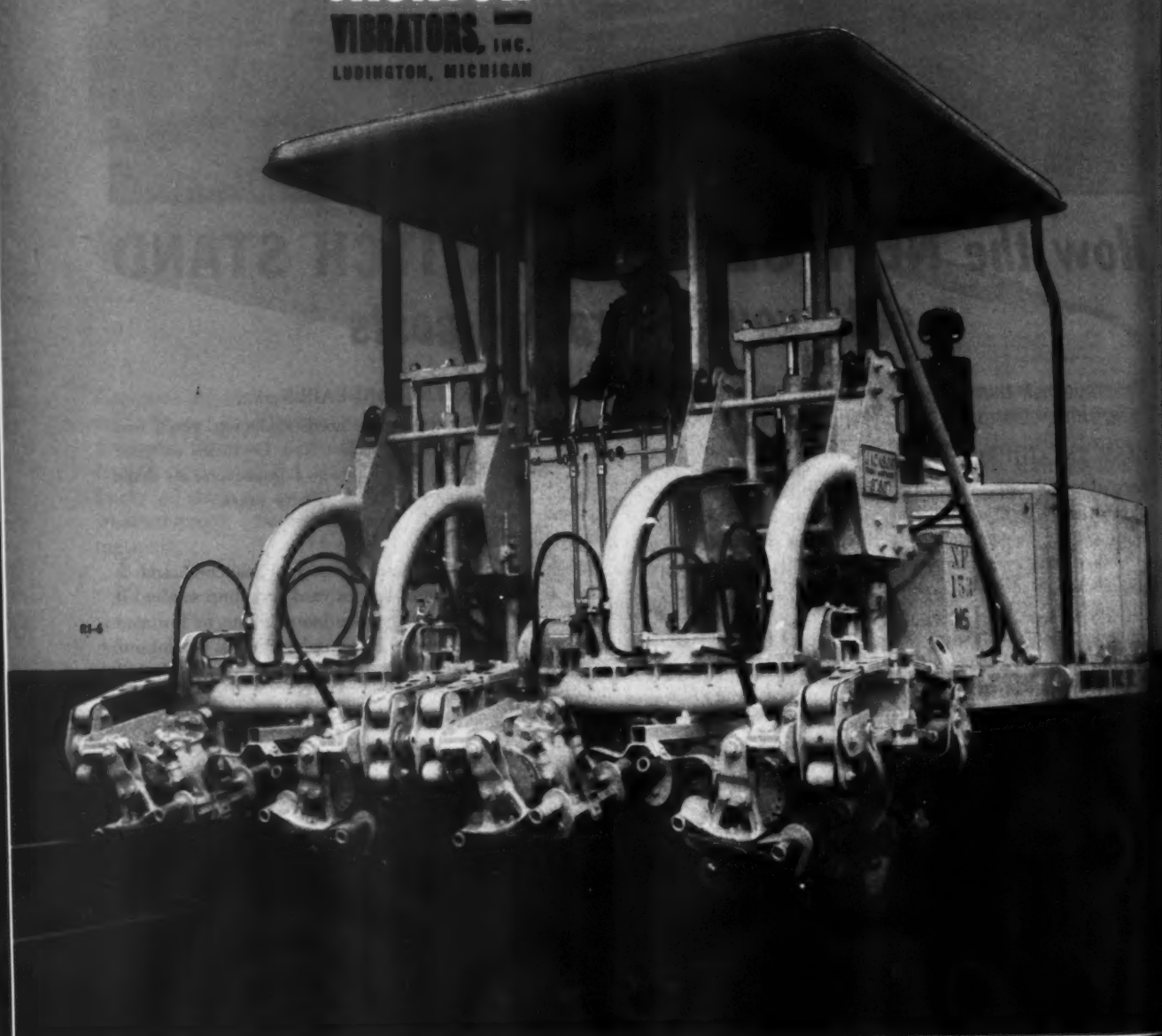

Railway TRACK and STRUCTURES

AUGUST

1961 • Vol. 57, No. 8

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SNOW FIGHTING—An *RT&S* staff report

What's new in techniques and equipment? 19

Points out some of the newer developments in methods, equipment and automatic controls now being tried out.

Power for these heaters is tailored to needs 22

An installation of electric switch heaters on C&NW features a timing device which permits power input to be regulated by storm conditions.

Tries out overhead infrared switch heaters 22

Santa Fe is testing the use of gas-fired units mounted over the track with the rays directed downward by means of reflectors.

Brush-cutting machine has 22-ft reach 24

Describes on-track hydraulic unit the North Western is using for cutting brush and trees with chain saws on pantograph arms.

'Miniaturized' rail-flaw test car has rubber tires 26

AAR has developed a Road-Rail vehicle for transporting its test equipment over the highways between rail-testing jobs.

Big office building gets new steel windows 32

Tells how the Santa Fe replaced deteriorated wood sashes with standard steel units without removing the old sills and frames.

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Don't miss . . .

A number of roads have installed test sections of concrete ties in the past year. How are they performing in service? What designs are available and who makes them? A special report will tell the whole story.

. . . in the September issue

New steels are born at Armco

ARMCO BIN-TYPE WALLS Provide ECONOMICAL Earth Retention

Armco Steel Bin-Type Retaining Walls are a low-cost way to gain or protect right-of-way on unstable slopes. You can be sure of low material cost, low installation cost and practically no maintenance expense.

Low material cost . . . Armco Bin Walls are composed of a series of deep-corrugated steel cells, joined as a single unit and filled with compacted granular material. Because of their design, relatively light-gage steel does the job.

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Maintenance of way

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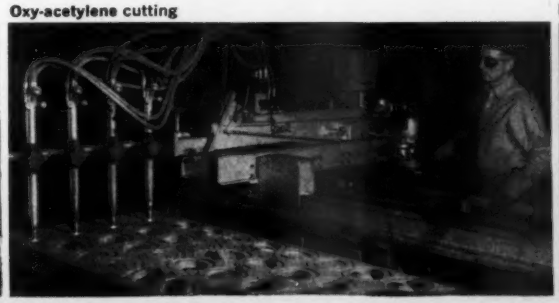
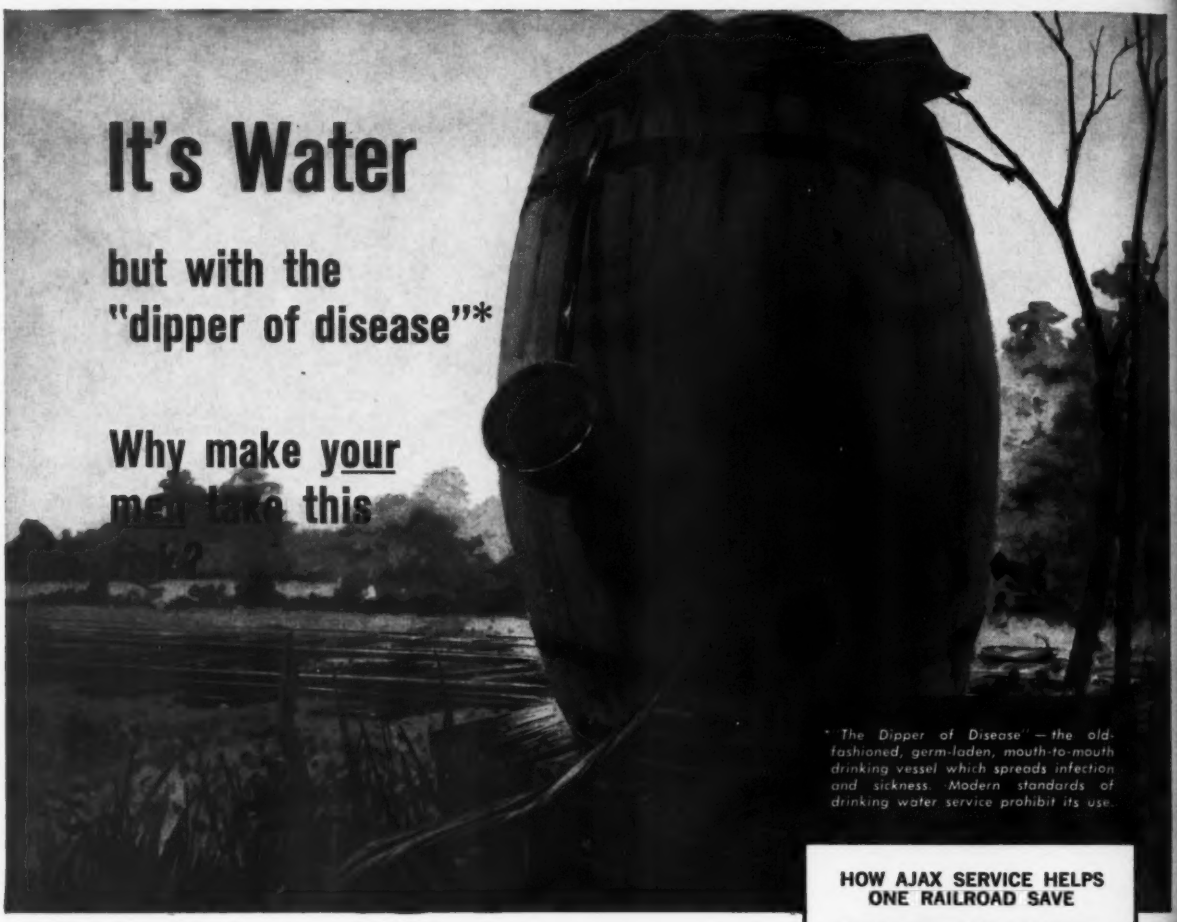


Electric welding



*"The Dipper of Disease" — the old-fashioned, germ-laden, mouth-to-mouth drinking vessel which spreads infection and sickness. Modern standards of drinking water service prohibit its use.

Let AJAX WATER SERVICE Promote Health and Safety While it Helps Keep Your Maintenance Budget in Line

Health protection for your men is a part of budget protection. You help assure both when you give your crews AJAX Refreshing Drinking Water Service: water cooler *and* personal service AJAX Cups. This popular service reduces costly absenteeism and work loss by removing a principal cause in the spread of colds and other infections.

The AJAX Service provides drinking water on the job. Eliminates time-wasting walks. Increases worker efficiency. Encourages the consumption of water needed for good health. Reduces fatigue. Personal service, convenient-to-use AJAX Cups can carry messages to promote safety, too. They help build morale. And you end the "dipper problem" forever with AJAX.

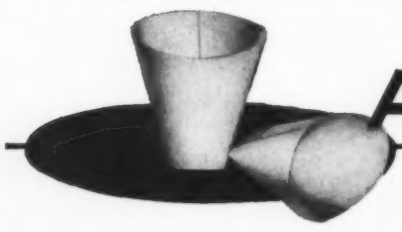
You'll be pleased by the low cost of AJAX Drinking Water Service. You'll be surprised at how this simple and modern system can help keep your maintenance budget in line. Write today for details.

HOW AJAX SERVICE HELPS ONE RAILROAD SAVE

Reports from one large road indicate that it enjoyed worthwhile savings in its maintenance budget after it adopted the complete AJAX Water Service. One big advantage is the fact that the standard installation fits right onto the track maintainer itself. Always ready; always at hand.

The AJAX Water Cooler is a heavy duty, 5-gallon unit. It is easy to sterilize and keep clean. Well insulated to keep water cool. The AJAX Cup Dispenser can be mounted on the cooler or attached separately to the track maintainer. It holds 300 AJAX Cups in the 4- or 6-oz. size. AJAX is the cup that dispenses open, ready to use. Available plain or imprinted with safety messages.

If you are looking for a way to increase worker efficiency and still keep your budget in line, look into AJAX.



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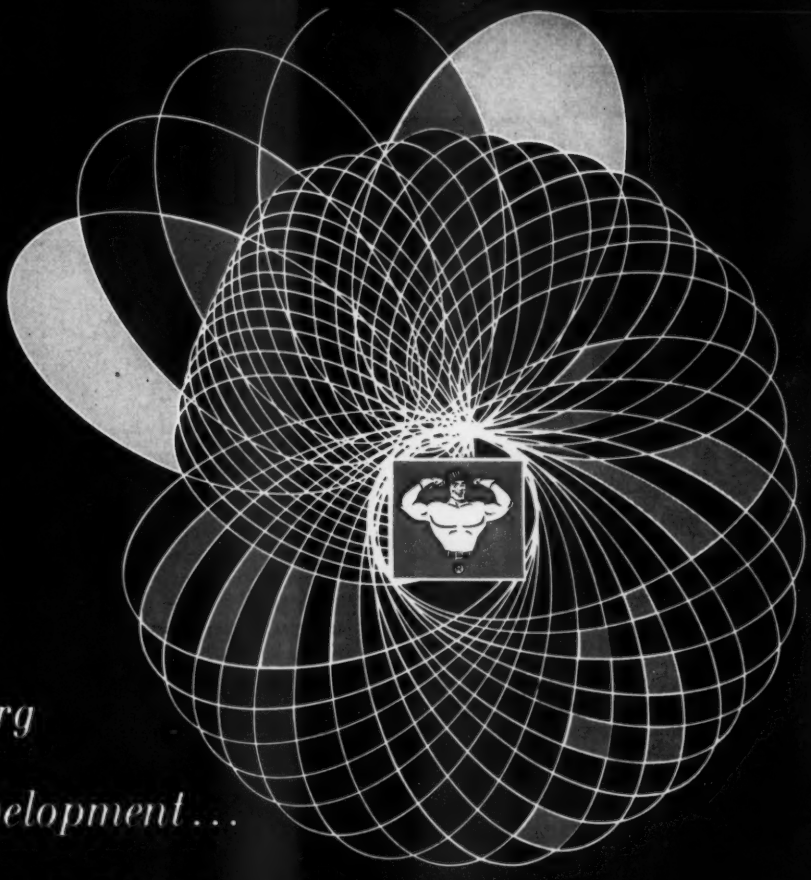

From Nordberg Research and Development... the best in Track Machines

■ **Good ideas are hard to come by.** More often than not, they come from long, hard hours—and even years—of study and experiment rather than as blinding flashes of inspiration. At Nordberg we have always been in the idea business—ideas to simplify and improve your work as well as to save you money. These ideas culminate in the form of machines.

■ There are now over 30 Nordberg railway track maintenance machines —we call them "Mechanical Muscles"—that were once only ideas, but are now *working* for Maintenance of Way divisions of major railroads throughout the world. Nordberg's continuing program of research and development, together with a great deal of cooperation from railroad men, made this track equipment possible.

■ Even though a machine is built and delivered, we constantly work on improvements. New metals are tested. Methods are developed to increase the versatility of machines now in service. The results will be a way to do your work better and faster at lower cost.

■ *May we put Nordberg experience to work for you?*

NORDBERG MANUFACTURING COMPANY
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NEWS ABOUT PEOPLE

T. S. Carter
M-K-T

J. Floyd Beaver
Southern

Henry R. Moore
Southern

George H. Echols
Southern

BIRMINGHAM SOUTHERN—Claude Johnston, Jr., chief industrial engineer, Fairfield, Ala., has been appointed chief engineer there, succeeding **Earl W. Bean,** chief engineer and roadmaster, who has retired after 36 years of service. In his new position, Mr. Johnston will be responsible for both the maintenance-of-way and industrial engineering departments.

ERIE-LACKAWANNA—Douglas B. Moore, assistant valuation engineer at Cleveland, Ohio, retired on June 30 after more than 39 years of service.

FRISCO—V. E. Yeargain has been appointed roadmaster at Hugo, Okla., succeeding **L. F. Woodlock** who has been transferred to Fort Scott, Kan. Mr. Woodlock succeeds **Earl Long** who has retired after 51 years of service. **R. E. Metzger** has been appointed trainmaster-roadmaster at Springfield, Mo.

MILWAUKEE—F. T. Betsinger, acting roadmaster at Marion, Iowa, has been appointed roadmaster there, succeeding **J. L. Vavra** who retired recently after nearly 39 years of service. **Curtiss E. Crippen,** assistant to the president and an engineer by training and experience, has been promoted to vice president—finance and accounting, with headquarters at Chicago.

MISSISSIPPI EXPORT—T. M. von Sprecken, Jr., has been appointed chief engineer at Moss Point, Miss., succeeding **Clifford T. Schwalb** whose death is noted elsewhere on this page. Prior to his new position, Mr. von Sprecken was trainmaster on the Southern at Sheffield, Ala.

MISSOURI-KANSAS-TEXAS—L. R. Deavers, assistant chief engineer, Denison, Tex., has been promoted to chief engineer, succeeding **T. S. Carter** who has been promoted to vice president-operations at Dallas, Tex.

NORTH WESTERN—D. E. Oakleaf, temporarily assigned as assistant engineer at Minneapolis, Minn., has returned to his former position as assistant engineer at St. Paul, Minn. **R. J. Christensen,** acting assistant engineer at St. Paul, has been appointed assistant engineer on the M&St.L division at Minneapolis.

PENNSYLVANIA—W. G. Kemmerer, Jr., assistant engineer at Chicago, has been promoted to supervisor track at Philadelphia, Pa. **R. W. Maxey** has been appointed assistant supervisor track at Enola, Pa.

SOUTHERN—J. Floyd Beaver, assistant chief engineer, system, at Washington, D. C., has been promoted to chief engineer, system, succeeding **George H. Echols** who has retired after more than 37 years of service. Mr. Beaver is succeeded by **Henry R. Moore,** chief engineer, maintenance of way and structures, Eastern Lines, at Charlotte, N. C., who in turn is succeeded by **James M. Peek,** assistant chief engineer, maintenance of way and structures, Central Lines, at Knoxville, Tenn. **Carl R. Perkins,** assistant division engineer at Princeton, Ind., has been promoted to division engineer at Selma, Ala. **Robert F. Cothran,** track supervisor at Charleston, S. C., has been transferred to Gastonia, N. C. **John S. Moore,** division engineer at Birmingham, Ala., retired recently after 41 years of service.

Obituary

Clifford T. Schwalb, chief engineer of the Mississippi Export at Moss Point, Miss., died on June 7.

Biographical briefs

J. Floyd Beaver, 57, who was recently promoted to chief engineer, system, of the Southern at Washington, D. C. (announced elsewhere on this page) was born at Spencer, N. C., and graduated from North Carolina State College in 1926 with a Bachelor of Science degree in civil engineering. Mr. Beaver entered the service of the Southern in 1926 as a student apprentice. He was promoted to track supervisor in 1929, division engineer in 1942 and trainmaster in 1944. Mr. Beaver was advanced to superintendent at Richmond, Va., in 1946 and to chief engineer, maintenance of way and structures, at Charlotte, N. C., in 1950. He was further promoted to assistant chief engineer, system, in 1956, the position he held at the time of his recent promotion.

Henry R. Moore, 45, who was recently promoted to assistant chief engineer, system, of the Southern at Washington, D. C. (announced elsewhere on this page) was born at Chatham, Va., and graduated from the Virginia Polytechnic Institute. He entered the service of the Southern in 1939 as a student apprentice, subsequently serving as assistant track supervisor and track supervisor at Camden, S. C., and Charleston. Mr. Moore was promoted to trainmaster at Columbia, S. C., in 1946, later serving in that capacity at Alexandria, Va., Greenville, S. C., and Greensboro, N. C., and to superintendent at Charleston in 1952, later being transferred to Alexandria, Va., and Somerset, Ky. He was advanced to chief engineer, maintenance of way and structures, at Charlotte, N. C., in 1956, the position he held at the time of his recent promotion.

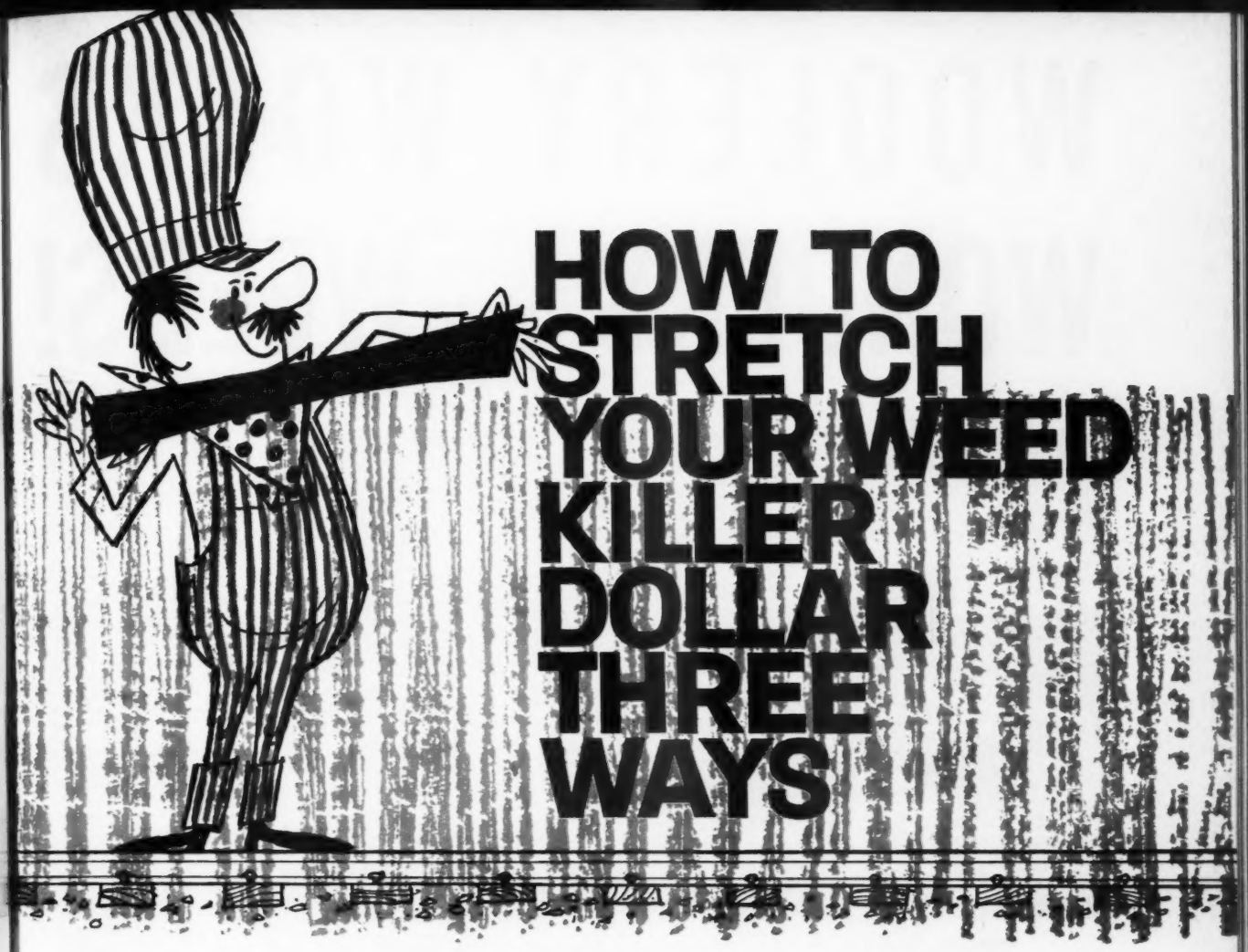
George H. Echols, 60, who recently retired as chief engineer, system, of the Southern at Washington, D. C. (announced elsewhere on this page) was born at Milledgeville, Ga., and graduated from the Georgia Institute of Technology in 1923. He entered the service of the Southern in 1924 as a junior engineer at Macon, Ga., being promoted to assistant supervisor track at Rome, Ga., in 1926 and supervisor track at Jacksonville, Fla., in 1930. Mr. Echols was further promoted to assistant division engineer at Atlanta, Ga., in 1935, to division engineer at the same location in 1946 and to chief engineer, maintenance of way and structures, at Knoxville, Tenn., in 1950. He was advanced to chief engineer, system, at Washington, in 1953.

Supply trade news

AMERICAN BRAKE SHOE COMPANY—Raymond A. Frick, executive vice president of the Railroad Products Division, has been promoted to group executive and division president, succeeding **Stephen S. Conway** who retired on August 1 after 49 years of service, according to an announcement by **Kempton Dunn,** president of ABS. The announcement also stated that Mr. Frick had been elected a vice president of the American Brake Shoe Company.

BIRD TIE PADS, INC.—The manufacturing facilities of Bird self-sealing tie pads were moved from East Walpole, Mass. to Myricks, Mass., effective May 1. Address all communications to **Bird Tie Pads, Inc.,** P. O. Box 909, Taunton, Mass.

KOEHRING COMPANY—Philip E. Cunningham, product sales manager in charge of crane-excavators, has been promoted to sales development manager for the Koehring Division. In his new position, Mr. Cunningham will be responsible for developing and promoting sales of the division's products, including crane-excavators, concrete paving and finishing equipment, off-road haulers and Mud-Jacks.



HOW TO STRETCH YOUR WEED KILLER DOLLAR THREE WAYS

NEW PRODUCTS

UREABOR® 31—New granular combination of 3 proven weed killers for dry application. Kills a greater variety of weeds, more effectively than any other herbicide on the market. One application keeps weeds down for a whole season. Effective control, plus low application rate and ease of application really stretch your weed killer dollar.

UREABOR 62—New High Concentration granular weed killer is chemically the same as UREABOR 31—only double strength—especially designed for the large volume user. Stretches your weed killer dollar even more as you save on freight, handling and application costs.

SERVICE

Only U. S. Borax offers the services of 23 experienced field men—who know your local weed, soil and weather conditions. They are available now to advise and *show you how* to get the most stretch from every dollar in your weed killer budget.

EQUIPMENT

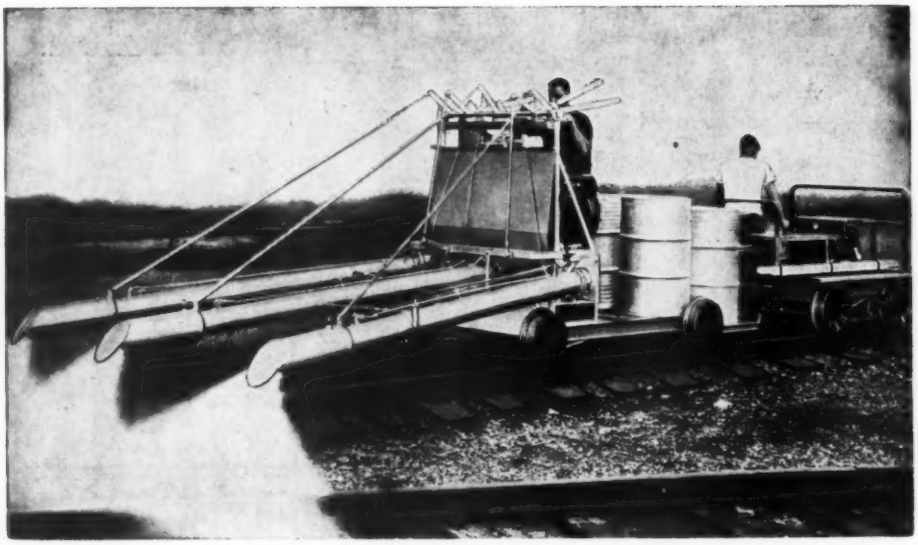
From yards and switches to rights of way and bridges, U. S. Borax can recommend a choice of weed killer spreaders from hand operated PCB Spreaders to power driven equipment to give you the most economical herbicide application possible. This equipment is specifically developed to stretch your weed killer dollar by applying U. S. Borax weed killers most economically in every situation.

Want to learn more about stretching your weed killer dollar? Write today for complete information.

U.S.BORAX

630 SHATTO PLACE, LOS ANGELES 5, CALIFORNIA

WOOLERY WORKS WONDERS with WEEDS!



THE WOOLERY WEED BURNER MODEL PB-B.

This trailer type weed burner can be towed by motor car. Three burner clear a swath 15-feet wide on first trip and if required can be widened to 25 feet with burner extended on second trip. Larger sizes available, including self-propelled models.

Small, light, inexpensive—towed by a motor car, the PB-B is the ideal burner for yard work—and in many cases BETTER than larger burners for on-the-line work. Can be put on the job FASTER! (Three other Woolery burners in larger sizes available).

Millions of dollars have been spent keeping roadbeds clear of weeds and also for keeping retarders and switches open in the winter.

Here is a versatile, flexible yard or on-the-line weed burner does WITHOUT FUSS —AND HAS BEEN DOING IT FOR YEARS! A good example of what we mean: it destroys all weeds COMPLETELY (due to individually controlled burner arms for raising and lowering as required by ground contour) In a 15-foot swath on one trip and—with burner arms extended on return trip —burns a 25-foot swath! YET THE PB-B CAN BE TAKEN OFF TRACK BY ONLY TWO MEN!

For further information ask for folder #170 or send your requirements to . . .

WOOLERY

MACHINE COMPANY

2919 COMO AVE., S. E.,

MINNEAPOLIS 14, MINN.

NEWS NOTES

. . . a résumé of current events throughout the railroad world

"The battle of the giants," as the newspapers refer to the fight between the Santa Fe and the Southern Pacific for control of the Western Pacific, got under way July 17 at San Francisco, at a hearing before ICC Examiner Paul C. Albus. But, before it could get started, the Department of Justice asked the ICC in Washington to throw out the applications of both roads. Justice contends that the SP, Santa Fe and other roads have been buying WP's stock since last October without commission approval and together they own almost 50 per cent of the stock. Examiner Albus did not permit argument on Justice's proposal. SP's President D. J. Russell led off the testimony, declaring that approval of SP's bid would lead to "various efficiencies and economies through coordination" of duplicating facilities.

The New Haven filed a bankruptcy petition with Federal Judge Robert P. Anderson in New Haven, after being turned down on its latest request for a government-backed loan to meet current expenses. Hearings are scheduled to begin on August 1. The bankruptcy petition prompted Senator Prescott Bush (R., Conn.) to propose that the New Haven, and any other road which has filed for reorganization under the Federal Bankruptcy Act, be allowed to keep the 10 per cent federal excise tax on passenger travel instead of turning it over to the U. S. Treasury.

The New York Central has proposed equal NYC-C&O ownership of B&O stock and a trusteeship for that stock, pending development of a three-road merger plan. NYC's President Alfred E. Perlman offered this plan to the ICC as a solution of the problem posed by its contest with the C&O for control of the B&O.

Net income of Class I railroads amounted to $26 million in May, compared with $47 million in May 1960. However, May's net income was enough to turn the five-month cumulative 1961 net from red to black. It overcame the four-month deficit of $9 million to produce a five-month net of $17 million. A total of 38 roads did not earn their fixed charges in the first five months of this year. Rate of return for the 12 months ending with May averaged only 1.45 per cent.

Numerous Plan III and Plan IV piggyback rates of the railroads have been cleared by the ICC. In approving the rates, the participating commissioners acted unanimously. The decision, a major victory for the railroads and a setback for the trucking industry, is a green light for further development of these services on rate bases which the railroads think they require to meet the competition, including that of unregulated and private carriage. Plan III is that piggyback service which involves transportation on railroad flat cars of trailers supplied by shippers. Plan IV contemplates that flat cars as well as trailers will be furnished by shippers.

Fifty-eight Class I railroads are now originating piggyback traffic. For the first 26 weeks of 1961, cumulative piggyback loadings totaled 286,305. This represents a 3.6-per cent increase over the corresponding period of 1960 and 40.8 per cent above 1959. Nine more railroads have joined REA Leasing Corporation's piggyback trailer and container pool, bringing total membership to 16. They are: CB&Q, Clinchfield, E-L, LV, MP, Reading, Frisco, SAL and Wabash.

Class I railroad employment continued to increase in June, the ICC reports. At mid-month, 724,947 were employed—a 1.61-per cent increase over the May figure, but 10.36 per cent under the June 1960 figure.

Fairmont POWER TOOLS

Hydraulic brawn makes quick work of trestle repair, other maintenance jobs!

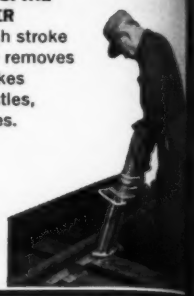
Fairmont hydraulically operated tools give crews smooth, safe mechanized power to speed timber trestle renewal projects, conquer confining space along water front facilities, make maintenance money go miles farther for many other jobs.

Hydraulic power, either pushing a cylinder or driving a motor, assures accurate control, easy operation—makes tools compact, light in weight, free of fumes, quiet in operation. Fairmont's hydraulic bolt puller (large photo at right), for example, utilizes a double-acting cylinder and 24-inch stroke to make light work of pulling drift bolts from open trestles.

In addition to the bridge maintenance tools shown at right, Fairmont hydraulic power equipment includes bolt cutters, deck liner and brace pullers, 20-ton jacks, jack beams and steel scaffolding. Besides the hydraulically motorized general-purpose hand tools below, Fairmont offers a larger-capacity impact wrench and a hacksaw that operates efficiently in confined spaces. Call or write today for full details on how Fairmont power tools and equipment can speed your maintenance operations.

Fairmont equipment is available on lease.

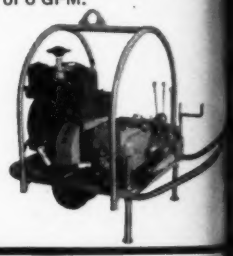
BRIDGE SPIKE PULLER has 8-inch stroke—quickly removes track spikes from trestles, other sites.



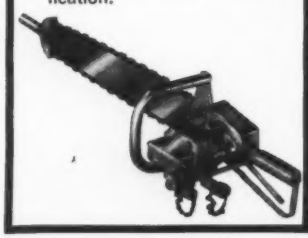
DECK JACK lifts one side of deck to facilitate renewing stringers in open deck trestles.

CHORD MOVER delivers hydraulic power for shifting chords to permit driving new piles.

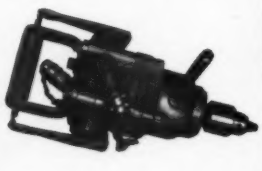
SINGLE PUMP POWER UNIT provides portable, compact hydraulic power source with output of 6 GPM.



HYDRAULIC CHAIN SAWS, in 20" and 30" models, work under water without modification.

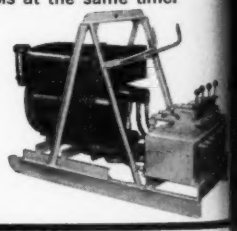


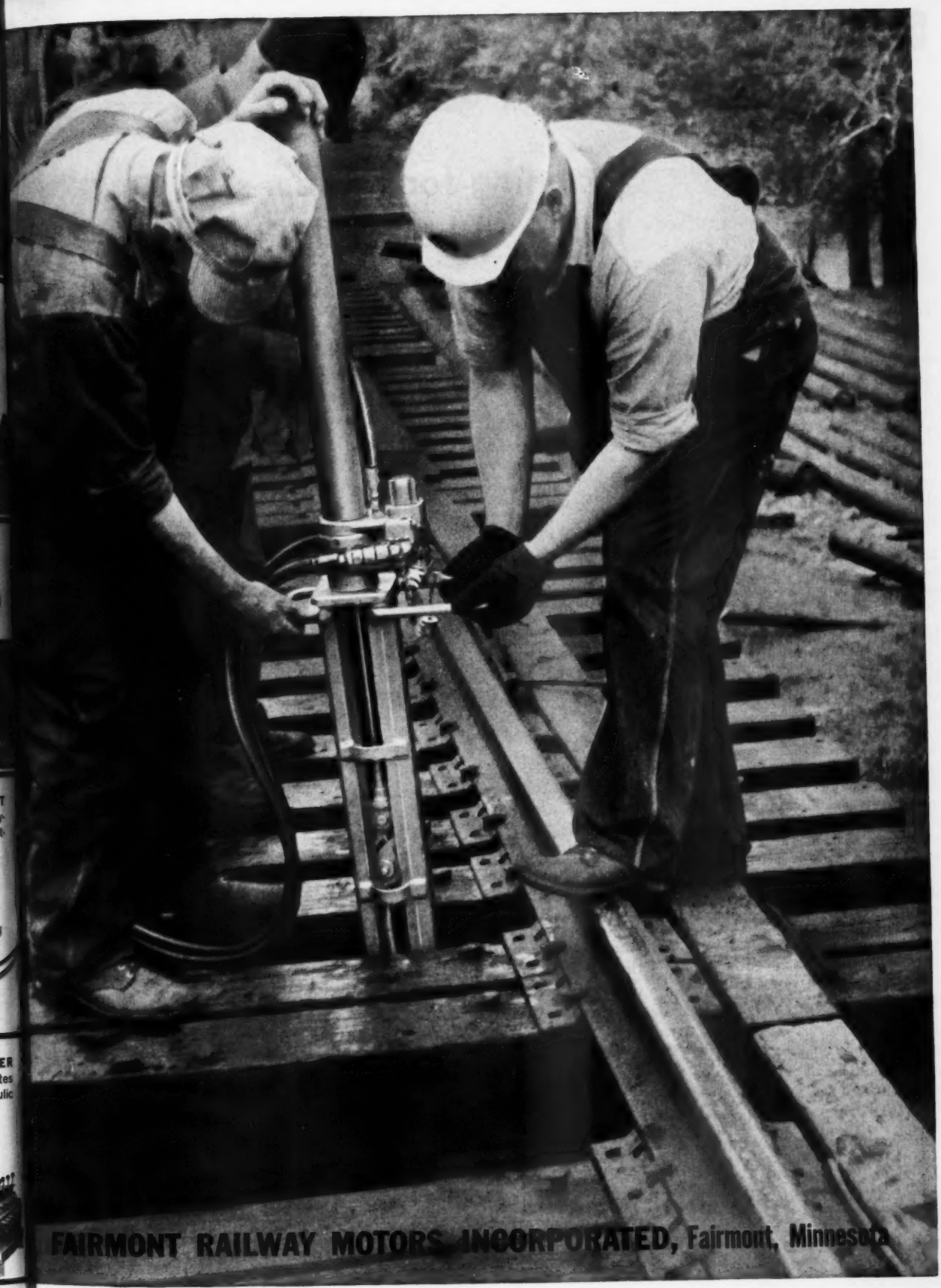
HYDRAULIC DRILL handles full range of bit sizes, even 1" diameter bits for wood.



HYDRAULIC IMPACT WRENCH is reversible—can be used to either loosen or tighten nuts.

MULTIPLE PUMP POWER UNIT has 4 pumps, operates up to 4 different hydraulic tools at the same time.




FAIRMONT RAILWAY MOTORS, INCORPORATED, Fairmont, Minnesota

Turnout maintenance

For a number of years rail programs have been at a low level. Coupled with new rail programs is the purchase of new frogs and switches for the turnouts involved in the relays.

As rail programs dwindled, so did the purchase of new frogs and switches. Such a situation increases the number of frogs and switches that require maintenance.

Poor rail can be made to ride better and stay in service longer by out-of-face grinding and by frequent surfacing programs. Such programs are also an aid at turnouts, and there is need for more of this work as well as for the machines that will tamp these difficult locations. But this is not the entire answer. They also need welding and grinding attention.

Preferably, such attention should be given before enough deterioration has taken place to require that the unit be removed from the track. It is much more costly to take out a frog and replace it with a new one than it is to repair the existing one while it is in service.

Welders' work is increasing. More rail ends and insulated joints need building up. More frogs and switches need their attention. And, they are called upon to do many more odd jobs than formerly, which draw them away from their programmed work.

Surprisingly enough, the number of welders on most railroads is no greater than when the railroads had substantial rail programs and were purchasing a lot more frogs and switches.

It is apparent that a situation is shaping up that will eventually require the railroads to take steps to correct the deferred maintenance now accumulating in their frogs and switches.

Planning for winter— It'll soon be too late

With the warm August sunshine beaming down on the land anyone who has the temerity to suggest that winter isn't as far away as it might seem is not about to be voted the most popular man in town. Since winter means more than the usual amount of hardship for railroad maintenance men they are apt to regard such a person as an extremely offensive character.

This magazine, regrettably, is about to declare itself in that category. For we are convinced that the warm days of August are just the days when maintenance men should be giving more than a little thought to the things that must be done if winter storms are to be handled with maximum dispatch and economy.

Having gone this far we might as well go all the way and make ourselves *persona non grata* with readers in the northeastern part of the country. We can do this in two easy steps: (1) By reminding them of the terrible winter of 1960-61; and (2) by suggesting that perhaps they could have been better prepared for it than they were.

The latter thought is based on a statement made by a manufacturer of snow-fighting equipment. The statement was to the effect that last winter he received many rush orders from railroads in the Northeast for spare parts to be shipped air express. Since some of these parts were large and heavy it is apparent that some pretty large shipping charges were involved. More important, it is equally apparent that costly delays to operations must have occurred while machines were tied up for repairs.

It is easy, when speaking from the wisdom gained by hindsight, to raise questions regarding any shortcomings in preparedness that might have prevailed on the railroads last winter, or any winter for that matter. Any statements made here concerning lack of preparedness for winter are not intended as criticism but merely to direct attention to the problem—and at a time when there is still an opportunity to do something about it.

The storms that struck in the northeastern part of the country last winter were unexpected in their severity. But then aren't they always? Until such time as long-range weather forecasting has been developed to a higher degree of reliability than at present, will it not always be necessary for the roads to be prepared for the worst winter storms that may happen?

In the days when snow fighting was done largely by hordes of men with shovels and brooms preparation for winter was largely a matter of taking steps to assure that a sufficient supply of manpower was available. Now that machines and mechanical devices have taken over a much greater share of the burden, the problem of preparation is not so simple. It is not enough to provide the required number of machines; they have to be in operating condition when the need arises.

As distasteful as the thought may be we submit that the month of August is not too early to be taking stock of snow-fighting equipment. Steps taken now to get it in shape and in position for action will save headaches and dollars later on.

SPECIFY **MECO** new model MC rail and flange **LUBRICATORS**

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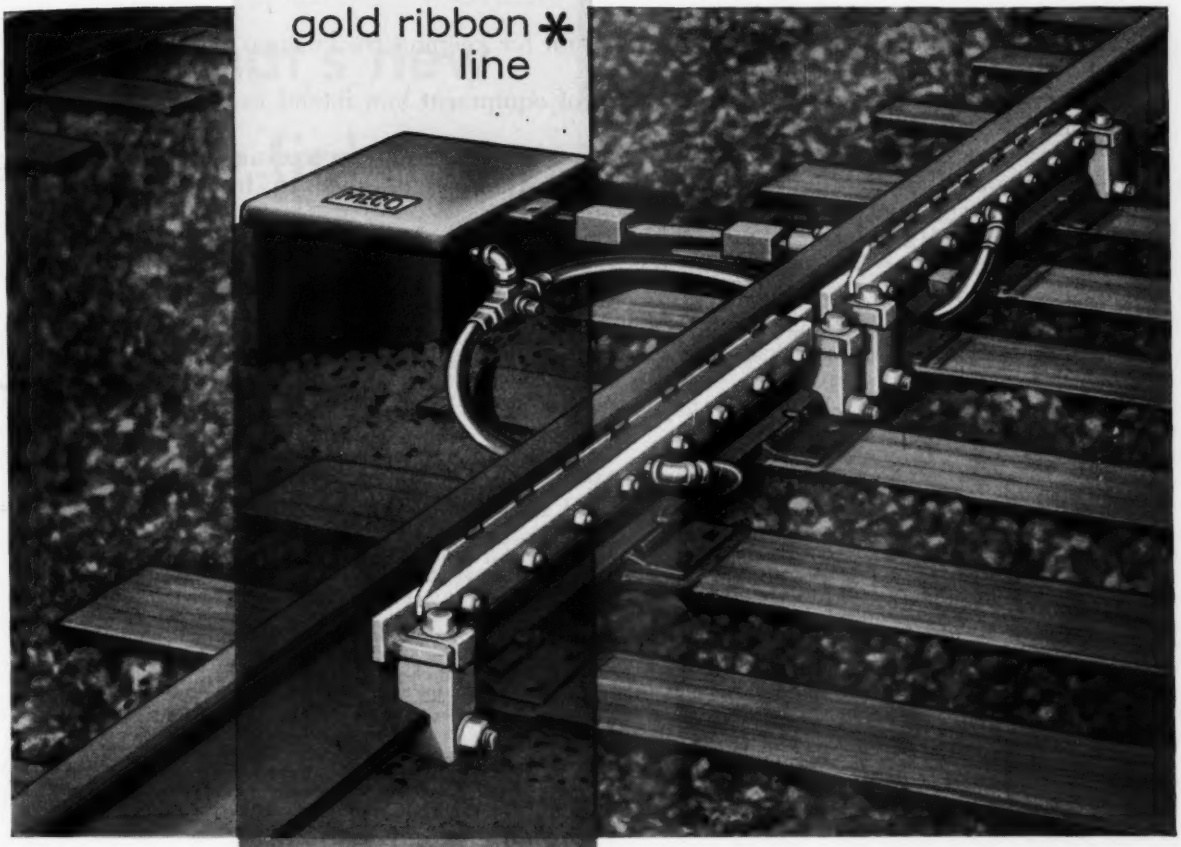

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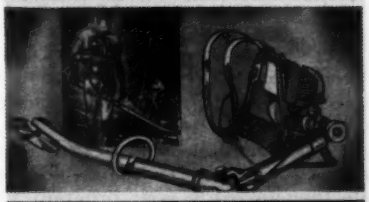


HIGH-SPEED BRUSHCUTTER

MACK, REVERSIBLE SWITCH POINT PROTECTOR

Y-895

gives dependable care-free lubrication everywhere it's needed, automatically

In modern railroading *every*where includes; grades, switch points, guard rails and running rails, as well as curves — *Every*where that friction-forces are at work, new "advanced design" MECO lubricators will reduce friction to a whisper. *Quadruples* the life of rails and wheel flanges!

MECO lubricators cost less to install—Attach to standard rail without special preparation. Once installed, a wheel-activated mechanism dispenses just the right amount of grease through the even-flow distributing bars directly to the rail and wheel flange for waste-free, care-free lubrication, automatically.

Ask one of our men to give you the extra-profit facts on the "gold-ribbon" MECO lubricator. Or write direct for full information.

MECO Maintenance Equipment Company

* a standard of quality, value, performance and service

RAILWAY EXCHANGE BLDG., CHICAGO • DIVISION OF POOR & COMPANY

PREPARING YOUR 'JORDAN' FOR SNOW WORK

Let's face it;

The money it costs your railroad to fight snow and ice *can* be reduced!!

Effective preparation for the winter season will save you many direct and indirect snow removal costs.

It is assumed you have a planned program for keeping tracks open during and immediatelv following a storm.

But what about the advance preparation of equipment you intend to use in this program? Particularlv, the JORDAN Spreader?

In plowing and spreading snow, ice and frozen matter on your trackage, the JORDAN reduces your snow-fighting costs to a minimum. It also enables you to "free" trackage for traffic with minimum delays.

The JORDAN is a Heavy-Duty machine. It is designed and built for your most arduous winter tasks without asking any quarter!

Like any piece of mechanical equipment, the JORDAN cannot work indefinitely without some attention. Certain components are subject to deterioration, depending upon extent of usage. A quick inspection of these components will reveal deficiencies, if any —and enable you to prepare the unit for winter cost-saving operations.

The best way to inspect a JORDAN is "under air". If shop air is not available a portable 125 c.f.m. compressor will do.

Your 'Jordan' Checklist

1. **Operate each valve in the manifold. Are valves free? Any air leakage in the manifold controls?**
2. **Observe the action of each operating cylinder as the valves are manipulated. Cylinder packings need replacement? How are the packing glands? In what condition are the piston rods?**
3. **Look at the hoses. Are they weathered? Connections showing evidence of air leakage?**
4. **When was the air reservoir last hydrostatically tested? Manhole cover gaskets need replacement?**
5. **Does the unit have a one-inch or larger air hose extension to connect the rear end sill valve to the locomotive reservoir? Condition of this hose? Any constrictions reducing its size?**
6. **While wings are extended, inspect the telescopic braces. Pinion gears worn? Locking blocks OK? Swivels and universal joints in good condition? Are the pins sound?**
7. **In the case of Spreader-Ditcher models, how are the pivot hinge butt casting and circular guide? Any signs of excessive wear or fatigue in the main wing hinge or pin? Are the wings straight? Do they move freelv in horizontal, vertical and diagonal directions?**
8. **Look at the stationary and slide post assemblies. On the Type A models, do the large brass bushings between the stationary column and the slide post show wear? Are the posts in good alignment?**
9. **Inspect the front plow and its operating mechanism. Crosshead OK? Cables and clevises sound? Sheaves in good condition? Do front plow wing plates hinge freely for directional plowing? Is the spring holding mechanism on the plow small end wing satisfactory?**
10. **Most important! Look at all cutting blades. For best results these blades should be renewed if any sign of wear is evident. This includes cutting blades on plow and wing surfaces.**
11. **Check the heating equipment. Be sure it is operable. Heaters are usually railroad-installed and vary in style and type. Fuel should be placed aboard as the deadline for equipment readiness approaches.**
12. **Ask your Mechanical Department to review the air brakes, trucks and running gear. Look closely at couplers and draft gears for possible damage. See if trucks are well oiled; brasses properly packed; side bearings, center pin and center plate well lubricated.**
13. **Inspect the tool box. Do you have the necessarv equipment to perform field maintenance, if needed? Have you a block and tackle or a push-pull hand chain wrench? Is all of the safety tie-down equipment for transit on the machine?**

The above inspection can be quickly performed—in less than a half a day. Any irregularities found here and immediately corrected will save many hours or days if a malfunction occurs during snow fighting later.

Remember, snow-removal operations are costly and occur unscheduled. Be prepared. Your advance preparation will save the railroad thousands of dollars in emergency snow work. Isn't it worth while then to ready your program and equipment well in advance?

For that matter, wouldn't it be worth while to do likewise each spring as well—just before your summer ditching and ballasting seasons? Of course!

JORDAN SPREADER

DOES THE WORK OF AN ARMY OF MEN

O. F. JORDAN COMPANY INC.

WALTER J. RILEY, Chairman of the Board

EAST CHICAGO, INDIANA

Railway TRACK and STRUCTURES

AUGUST 1961

Vol. 57, No. 8

Winter ahead!

What's new in snow fighting techniques and equipment?

FOUR MONTHS from now, snow-covered tracks will be common. Here, a Jordan spreader with a high snow plow breaks through frozen and encrusted material.

Although railroads are making intensive use of the conventional means for coping with the snow problem, reduced forces and longer territories make it mandatory for railroads to minimize the cost of snow handling even more than in the past. This article points out some of the newer developments in methods, equipment and automatic controls now being tried out.

● The problem of coping with snow and ice is an old one for American railroads. Except for some of the more advantageously located roads in the south, railroads have been fighting snow since their first year of operation. Many of the earliest means of dissipating snow, such as snow brooms, salt, plows, spreader-ditchers, flangers, fences and sheds, are still widely and effectively used. Later developments, such as electric, gas and oil-burning switch heaters, snow blowers, weed burners, trucks and earthmoving units, also are in extensive use. But new techniques and equipment are emerging and are invoking considerable interest.

Infrared heaters

One of the recent developments is the adaptation of infrared rays, generated by gas-fired burners, for heating switches. Both natural and propane gas are used to generate this energy. The gas flows through a pressure regulator, passes through a manifold and an air-aspirating chamber to the burner heads. The latter have mats with tiny perforations through which the gas is forced and burned on the outside. The housing of each burner has reflectors for directing the infrared rays to the area to be heated. The infrared rays can be ignited manually or electrically by remote control.

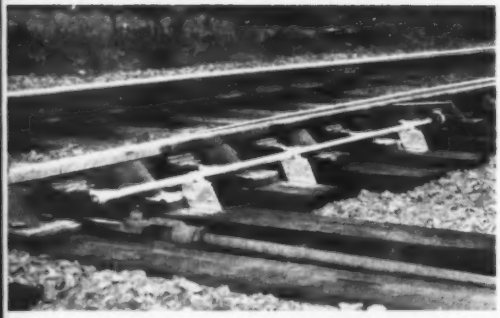
Two methods of utilizing the infrared energy are being used, both of which have proved successful. One is to assemble several large burner panels together in a housing, erect them overhead on a standard, and reflect their heat downward on the switch area (see article on page 22). Another practice is to mount several small infrared burners at regular intervals on a manifold which holds them against the outside of the webs of the stock and straight rails at a switch. Five to eight burners on each manifold, the number depending upon the length of switch, keep the points free of snow and ice.

Snow protection at outlying turnouts, particularly in CTC territory, is a problem that is receiving more attention. Switch heaters at some of these locations are turned on and off by the dispatcher through his CTC circuits after he is notified by passing train crews that snow is accumulating at the turnouts.

Snow detectors

In other instances, devices which detect the presence of snow, sleet or ice in or around a switch are installed for turning switch heaters on and off. These devices, made by the Rails Company, have sensing heads that are heated when the temperature lowers to a predetermined and preset point. Hail, snow and sleet falling on the head are melted and the resulting moisture turns on the heaters. The sensing heads are placed in the track close to the switch point and, in some instances, underneath it so that they will be affected by conditions in this area. Some railroads use two of these sensing devices at a switch, one at the switch points and the other on a nearby pole.

One interesting intallation of this sensing device is at a spring switch in automatic-signal territory where there is no available control for the dispatcher to use for operating the



INFRARED RAYS generated by propane gas were used by this Lambert switch heater for keeping a switch open.

RAILS COMPANY snow detector, placed ahead of switch point, turns on heaters when snow falls on sensing head.

COMPRESSED AIR used by Racor Snow Blower is released in intermittent blasts to keep switch-point area clear of snow.

switch heaters. A sensing device is located under each switch point to minimize physical damage. These turn on electric switch heaters at approximately 38 deg F at such times that the moisture-sensing head becomes effective. Further protection is governed by the position of the switch points. If ice should drop from a passing train and prevent the points from going to their normal position, the sensing device keeps the switch heaters in operation until the switch obstruction has been cleared and allows the points to return to their normal position.

Another sensing device has been reported which functions in a manner similar to the one mentioned. It has a bowl for collecting snow and sleet, which is heated electrically whenever the outside temperature goes below a preset level. The melted snow cuts in current for electrically igniting the switch heaters. The current heating the bowl is so controlled that it will melt snow as long as the outside temperature is above 15 deg F, at which point additional current is supplied for melting snow below this temperature, keeping the device operative.

Snow blowers

Since the wind often is responsible for depositing snow at switches, the idea of using air currents for removing snow has logically resulted in the development of several types of snow blowers. Frequently used is the tractor-mounted air compressor, sometimes equipped with flanged-wheel attachments, which forces air through a hose and nozzle at high velocity. The air stream is directed around each switch point to blow the snow clear of the points and to one side.

Another type is a blower, made by American Brake Shoe Company, which is permanently installed at an individual switch. This device uses compressed air, either from an individual compressor or from a central supply line, to blow the snow from the area between the switch point and adjacent stock rail. The compressed air is filtered and injected with an anti-freeze solution before going to a cycling tank which, by pressure switches, releases air in intermittent blasts through a manifold installed under the head of the stock rail. A number of orifices in the manifold, cause jets of air to be discharged at high velocity, clearing the openings of all loose materials. At the beginning of a snow storm, the compressor is turned on by remote control or by local manual control.

The New York Central has developed a high-velocity snow blower which is used to blast snow from switches and tracks. The main unit of this machine is an airplane jet engine which is mounted on one end of a flat car. A cabin with cupola is mounted at the other end for the protection of the operator and crew. The blast is directed downward at an angle toward the track with the result that all loose material is literally blasted from the track area. This jet-engine blower has since been further developed by an outside concern and mounted on rubber tires for general use.

Among the more recent snow blowers is one developed by the Milwaukee Road (*RT&S*, March 1961, page 68). This blower is mounted on a push car which is towed by a self-propelled track unit or motor car. A large fan, powered by a 35-hp gasoline engine, creates a 100-mph air blast that is directed downward by a nozzle toward the switch. It blows all loose material from between the rails and points and deposits it up to 30 ft on each side. "These machines," said V. E. Glosup, Milwaukee's chief engineer, "are for keeping our switching leads cleaned. There's no water or ice problem later nor any clean-up work to be done." The Milwaukee now has nine such units which are assigned to various terminals.

During the off-season, these units have been used to blow away sand dropped by switch engines. They have also been employed in tunnels for blowing out exhaust fumes from machines being used to lower the track.

Efficient use of manpower

The fewer number of men currently employed on railroad maintenance has led to the introduction of practices in coping with snow that are different from those used a few years ago. Although many railroads continue to employ extra men for contending with heavy snow storms, the number required these days is much smaller than formerly. The trend now is to do most of the snow clearing work with existing forces, aided by machines, and to concentrate the work on the more important switches and tracks. Operating departments on most roads cooperate with the track forces by

designating certain switches and tracks which must be kept operable, with the understanding that the less important switches will be cleared as soon as the opportunity permits.

Some roads conserve manpower by assigning a trackman to a switch engine so that he can sweep or shovel only those turnouts that are actually used. The EJ&E has improved on this method of conservation by the use of radio for its M/W forces (*RT&S*, June 1961, page 35). Under the arrangement, switch-engine crews use their radio to call the yardmaster whenever a snow-blocked switch is encountered. This information is then relayed to the roadmaster who contacts the nearest track gang by radio to give them instructions.

While most railroads now maintain lists of contractors and their equipment which can be made available in case of a snow emergency, some roads in suburban territory have gone a step further. Yearly contracts are negotiated with contractors to take over the cleaning of snow from station platforms. This relieves the track forces of this work and allows them to concentrate on keeping tracks and switches open.

At least one terminal line has adopted an interesting innovation aimed at preventing switch points and rods of yard-track turnouts from becoming iced in from melted snow. Holes 2 or 3 ft in diameter and about 5 ft deep, are dug close to the switch points and backfilled with stone. Any water collecting at the switches drains into these holes and is led into the subsoil.

Jeeps with snow plows

An interesting side light on modern snow fighting is the use that the Erie-Lackawanna made last winter of a fleet of 23 Jeeps it acquired last fall. These vehicles are largely assigned to track supervisors for inspection and transportation purposes. They are four-wheel-drive pickup trucks, equipped with flanged-wheel attachments and two-way radio communication. Realizing that a supervisor might often require a snow plow to get the Jeep off the track at road crossings, the trucks were also equipped with a snow-plow attachment, the blade of which is 7 ft wide.

Last winter, reports L. H. Jentoft, the road's assistant chief engineer maintenance of way, when extremely heavy snowfalls plagued the Eastern district and snow-fighting equipment was scarce, the Jeeps joined in the fight and proved highly successful. They were particularly useful, he said, for plowing station platforms, road crossings, driveways and walks.

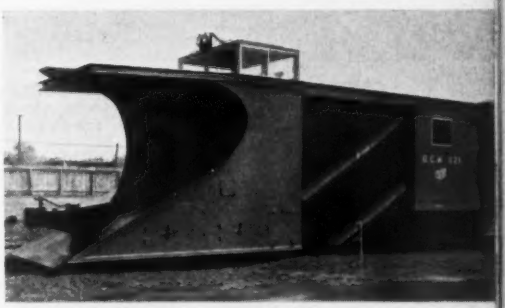
Mr. Jentoft also reports that another recently acquired machine, a large Hough Payloader, gave good service in a terminal area. Straddling the rails, this unit opened up snow-clogged tracks and switches and cleaned driveways. Handling from 5 to 8 cu yd of snow at a time, each bucketful loaded a truck. When used on wharves and docks, the Payloader would pick up a load, run to the end of the dock and dump the snow into the water. During this summer the unit was used advantageously to load ore.

The foregoing discussion is largely concerned with snow fighting in terminals. The preponderance of this article has been devoted to this phase of the subject because that is where the more recent developments have largely been concentrated. There remains, however, the ever-present problem of keeping the running tracks open during winter snows. In this area we find that most roads continue to rely on the time-proven equipment they have been using for many years—equipment such as wedge plows of various types and plows of the spreader-ditcher type.

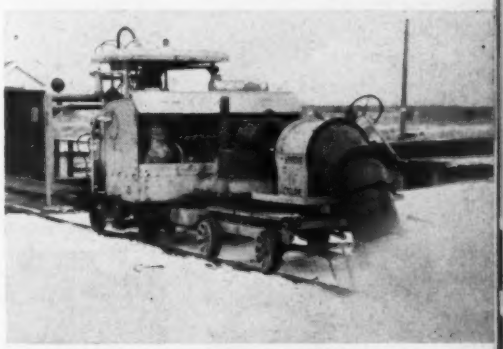
Snow-fighting experts emphasize the importance of putting the use of such equipment on a systematic basis to assure it will be used to best advantage. For example, during the winter one large road attempts to make the most effective use of its plows and spreader-ditchers by maintaining constant surveillance over weather conditions throughout the system with the objective of shifting units of equipment from one district to another to deal with threatening conditions.

There are "tricks of the trade," too, in using snow plows under difficult winter conditions. An example is the practice, followed particularly in Alaska and Canada, of assigning several bulldozers to work with a spreader-ditcher to help open up snow drifts of unusual depth. When such a drift is encountered the bulldozers move out ahead to cut the top off the drift.

It should also be pointed out that developments in snow-fighting equipment have not been confined to the items used at switches and in terminals. As an example, the hydraulic spreader-ditcher, a fairly recent development, is said to be better adapted for fighting snow than air-operated machines. Reasons are that the hydraulic operation gives better control over the various movements and also results in smoother operation.



LATEST DESIGN of its wedge-type snow plow, which was recently delivered by Jordan to Quebec Cartier Mining Co.



FIRST MODEL of nine snow-blowing machines built by Milwaukee Road for keeping its switch leads cleared of snow.

JEEPS, assigned to Erie-Lackawanna track supervisors for transportation, were also used as snow plows on yard tracks.

Developments in switch heaters

CONTROL panel, located in interlocking tower (above), regulates power to electric heaters (below) to suit conditions.

Power for these

● A timing device which permits the power input to be regulated in accordance with prevailing storm conditions and keep maximum power demand at a minimum is a feature of an installation of electric switch heaters at an important interlocking on the Chicago & North Western. Another feature is that the heaters, which include ballast heaters, may be turned on and off by flicking a switch in the control tower.

The installation was made last year when the road consolidated four of its Chicago interlockings into one plant at Clybourn Junction. In connection with this project the snow-protection facilities at 21 of the turnouts were modernized.

A consideration in the selection of electric switch heaters for this installation was the fact that the road purchases were from a local producer for air conditioning the new interlocking tower, as well as for powering local signal facilities. Hence, even with the additional demand charge, a favorable rate was available which makes the use of electric switch heaters relatively economical. Furthermore, since the power company has a reputation for maintaining continuous service, the power source was considered highly reliable.

In the design of the new switch-heater system consideration was given to the fact that water from melted snow could build up in the ballast cribs and later freeze, with the possibility of icing in the switch rods and immobilizing the switch. To avoid this situation, Q & C ballast heaters, were installed, with two being placed under each of the No. 0 and No. 1 switch rods. Water in these areas now either seeps into the ground or escapes otherwise from the cribs.

For heating the switches Chromalox electric heaters were used. These were installed along the outside of the stock and straight rails that mate with the points. They were positioned along the webs of the rails 1⅞ in above the base of rail. The Racor Security rail braces supporting these rails were machined to provide a ⅜-in slot for the heating cables. Lengths of the heating cables were varied to conform with the 19-ft 6-in, 25-ft and 30-ft switch points used in the plant layout.

Conservation of power was an-

OVERHEAD type of infrared heaters directs rays over entire switch area.

Santa Fe tries out

● An entirely new approach to the problem of keeping switches free of snow is being tested on the Santa Fe. It involves the use of gas-fired infrared heaters mounted overhead with the rays being directed downward and concentrated in the area of the switch.

The initial installation was made in October 1960 at a crossover switch in the westbound main track at Amarillo, Tex. Since that time the road has been running a series of tests for the purpose of developing an efficient basic design, according to R. H. Beeder, system chief engineer of the Santa Fe.

The principle of the use of infrared heaters is that the heat generated warms the track and ground objects without heating the surrounding air. Once the energy waves emitted by the gas generator strike the track, they are transformed into heat and the track materials then act as radiators themselves and re-radiate heat.

Like light waves, infrared rays may be directed and controlled. This is done by means of reflectors which may be straight sided to give a spread pattern, or parabolic where a more directional pattern is desired. The units may be mounted overhead or on the side at an angle. The Amarillo installation uses parabolic reflectors which are mounted over the tracks.

The heaters used in the Santa Fe installation are the Schwank-Perfection infrared generators manufactured by Perfection Industries,

heaters is tailored to needs

other design consideration. The C &NW wanted to provide enough heating capacity in the system to keep the switches operable under the most adverse temperature, wind and snow conditions which could be expected at this location. But, since the preponderance of storms could be expected to be less severe, it was also desirable to limit the use of power by installing an electrical system that could be easily adjusted to suit varying storm conditions. This problem was solved by incorporating an effective timing device in the system and installing it in the interlocking tower.

This device is a Zenith motorized cycle timer on a one-minute continuous rotation with a five-position selector switch. It regulates six control centers, each of which is activated to turn power on and off through contactors and circuit breakers to the switch and ballast heaters under its control. The six control centers power the heaters for the 21 switches, three controlling three switches and three controlling four switches.

The timer is so constructed that it directs each control center to take power for a period of 20, 30, 40, 45 or 60 sec, depending upon the position at which the selector switch is set. At any particular setting the timing mechanism is such that the heaters in each control center are receiving continuous power for a portion of each minute (20 sec, 30 sec, etc.). During the course of each minute the power rotates consecutively between control centers on an overlapping basis. This arrangement assures a steady power consumption.

When the selector switch is set at its first position, one-third of the peak load is being used and two control centers are taking power at the same time. At the second position, one-half of the peak load is being consumed by three control centers at one time. At the third position, two-thirds of the peak load is being taken by four control centers at one time. At the fourth position, 81.25 per cent of the peak load is being consumed for 45 sec of each minute by five control centers simultaneously. When set at the fifth position, the peak load is being used and all of the heaters are powered for the full minute.

To activate the system, the tower operator throws a switch on the timer. Initially, he sets the selector switch at the first position. If he observes that the snow is not melting fast enough and is accumulating at the switches after a reasonable period of operation, he then turns the selector switch to its second position. He continues to observe the snow-melting process and adjusts the selector switch until the switch points are clear of snow.

The timing device has indicating lights on its cover to reveal how it is functioning. Five red indicating lights show the position of the selector switch. Also, there are six green indicating lights each of which lights up when the control center it regulates is taking power.

The road reports that its experience to date with this installation is limited owing to the fact that it has been in service only during one mild winter. However, the heaters functioned satisfactorily during two bad snow storms, one of which deposited an 8-in snow cover in about 10 hr while the other dumped 13 in of snow in 20 hr. The road also reports that the electric switch heaters proved economical.

overhead infrared switch heaters

Cleveland, Ohio. Both natural gas and propane gas, the latter supplied in 1,000-gal tanks, have been used for fueling them. They are of the marquee type and are mounted in two banks of three generators each at a height of 23 ft above the track. The burners have a total input of 288,000 Btu per hr. About 50 per cent of this fuel energy is converted into usable infrared radiant heat. This amount is reported to be about twice the potential needed to handle the heaviest snowfall in Amarillo.

The heaters turn on and off automatically. They are controlled by both temperature and moisture. Before the heaters will ignite, there must be a combination of both low temperature and sufficient moisture to activate a thermostat and a moisture-sensitive electronic switching circuit at track level. Low temperatures alone will not activate the generators.

Reports are that the performance of the Amarillo installation has been encouraging. Although no really heavy snowfall occurred there last winter, 7 to 8 in fell in 9 hr on March 17, accompanied by 30-mph winds. The heaters, it was reported, kept the area dry and free of the snow which had fallen.

To further the tests, additional units have been installed as follows: One at Joffre, N. M., two at Tejon, one at Mountainair, two at Keoto and one at Wootton, the latter three being on Raton mountain. These units are similar in design to the Amarillo installation except that they utilize a newer model generator that contains a motor and blower to pressurize the housing against wind. However, the road reports that wind has not been a problem with the older model installed at Amarillo. Even with 60 to 70 mph winds, the pilot flames remained steady.

It is reported that the major problem encountered so far has been one of reflector design. The reflectors on standard models spread the infrared rays over a 40-ft circle. To conserve this energy and improve unit efficiency, Santa Fe officers feel the rays should be concentrated over the switch only. The installations on the Santa Fe have full parabolic reflectors that tend to confine the rays to the switch area only.

PANTOGRAPH ARMS, each controlled by an operator, can be adjusted to conform with the ground contours.

Brush-cutting machine has

● Not long ago a number of officers from various railroads gathered to inspect a new brush-cutting machine in action on the Chicago & North Western's branch line near Dundee, Ill. Developed under the direction of M. S. Reid, assistant chief engineer-maintenance, C&NW, R. W. Bailey, engineer scales and work equipment, C&NW, and S. A. Rishovd, vice president, Northwestern Motor Company, it is the first of a number of such machines which the C&NW plans to acquire to cut brush on its right of way. The machines will be built by Northwestern Motor Company. The road estimates that such machines can be used on at least one-third of its roadway mileage where it has brush problems. Each will average 4 to 5 miles of roadway per day, depending upon the density of the brush.

The brushcutter has a pantograph arm on each side at the end of which is mounted a chain saw, 7½ ft long. Through hydraulic controls, the arm can be extended to enable the saw to reach out and cut all brush within 22 ft of the center line of track. Through other hydraulic controls, the arms can be raised and lowered and the chain saws themselves can be individually raised and lowered for positioning the saws to conform with the contour of the ground. It is pointed out that this feature makes the brushcutter operable even in the roughest terrain.

The brushcutter is powered by a Wisconsin VR4D gasoline engine which runs at a constant speed. Through direct drive the engine operates three Racine hydraulic pumps. One of these is used for propelling the unit from zero to 5 mph while working and up to 30 mph while traveling. Each of the other two hydraulic pumps supplies the power for a pantograph arm.

Several considerations were involved in the design of the brushcutter. The density of the brush will vary on each side of the track, as well as its location with respect to the track. This pointed to the need for a saw which would not only cut large and small saplings and trees but also one which could be moved close to and away from the track. Also, the contour of the ground will vary, sometimes very sharply, on the same side of the track. This called for a saw which could be changed in plane to suit the terrain. For such conditions, several controls were necessary and the machine was designed for operation by two men, with each one manipulating controls for the proper positioning of one of the chain saws.

For the normal operation of one saw, the operator has six controls. One controls a hydraulic ram which raises and lowers the saw at the end of the pantograph. Another controls a second ram which raises and lowers the pantograph arm. Another controls a ram which extends and retracts the pantograph frames. A fourth control swings the pantograph arm on a pivot 15 deg forward and backward. A fifth controls the operation of the chain saw on its track and the sixth control switch induces a 3-in long reciprocating action of the chain-saw frame in relation to its pivot.

The cutting edge of each saw has eight tines which project forward and provide positive points for holding supple saplings while the chain-saw cuts them. The reciprocating action of the chain-saw frame, which is activated by an electric solenoid valve, moves the tines rapidly back and forth so that if any one should strike a tree trunk head-on during the forward motion of the machine, the tine will be shaken free so that the saw will engage the tree trunk.

Other controls include a tilting foot pedal which governs the forward and reverse motions of the machine; a hand lever which is used to change the propelling power from working to traveling speeds; a foot pedal for activating the unit's hydraulic brakes; and a lever to disconnect the power of the gas engine from the hydraulic pumps.

Provision has also been made to prevent breakage of the pantograph in the event the machine moves forward faster than the saw can cut a large tree. An overload relief valve was installed on the ram which swings the pantograph 15 deg forward and backward. When overloaded, the relief valve opens and allows

22-ft reach

After a year's experimentation with a pilot model, the C&NW has developed an on-track hydraulic brush-cutting machine which projects chain saws outward on pantograph arms for cutting brush and trees within 22 ft of center line of track. It has cut trees up to 7½ in. in diameter and is designed to handle trees as large as 8 in. Working at speeds up to 5 mph, it averages 4 to 5 miles of right of way per day, depending upon the density of the brush, saplings and trees.

the pantograph to swing back without damage.

Another problem was the cutting speed of the chain saw. To speed up the cutting, it was decided to speed up the travel of the chain. Ordinarily, chain saws of this size would operate about 1,600 ft per min, but it was found by experimentation that 4,000 ft per min was necessary to permit the machine to operate at 5 mph. To prevent the chain from becoming overheated at the higher speed, an oil bath was provided for it. Seven oil orifices were introduced behind the track of the saw chain, through which an inexpensive heavy oil, of a viscosity ranging from 40 to 70 SAE, is forced by a pump. For this purpose, a crankcase oil that has been cleaned is used. Since the centrifugal action of the chain sprays the oil quite freely over adjacent vegetation, a combination of 2,4-D and 2,4,5-T has been added to the crankcase oil as an experiment to see if it will be effective in stopping or reducing stump regrowth.

Where small clumps of brush and shrubs are encountered, the practice is to make two passes with the brushcutter. The first pass cuts the growth on each side from 7 to 15 ft out from the center line of track and the second pass gets the growth out to 22 ft. Where the clusters of brush have heavy growth, the practice is to concentrate the cutting on one side at a time.

ABOVE—Before the arrival of the machine, this patch of brush had encroached almost to ends of ties.

RIGHT—Chain saws are positioned for the first pass to cut from 7 to 14 ft from the center of track.

BELOW—Second pass of machine gets the heavier brush. Tines on saws hold them in place while sawing.

ROAD-RAIL TEST CAR utilizes the AAR's residual magnetic system. Electro-magnets for energizing the rails are located just behind front tires. Pickup units for detecting flaws are located on carriages behind the rear guide wheels.

'Miniaturized' rail-flaw test car

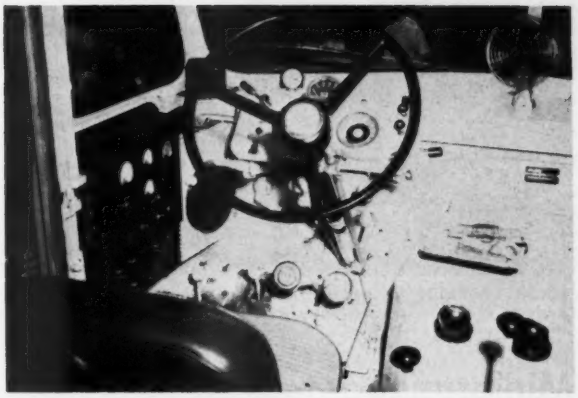
The AAR has developed a new type of vehicle for transporting its rail-flaw detecting equipment. Weighing less than 15,000 lb the car can travel on the highways as well as on the track. It is operated by only two men and features miniaturized testing equipment.

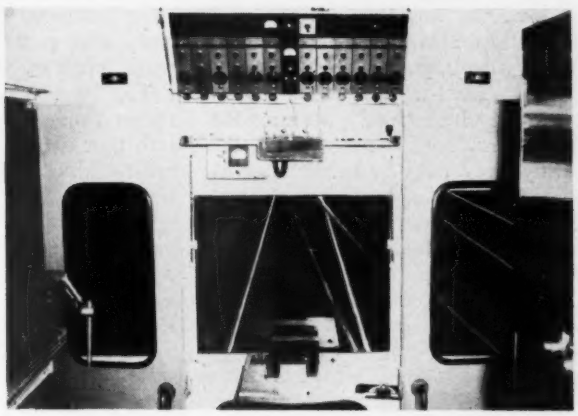
RUBBER TIRES on new car enable it to use highways between rail-testing jobs. On track, the rubber tires carry all but 4000 lb of total weight of vehicle.

● Something new in the way of rail-flaw detection equipment has been developed by the Association of American Railroads. Unlike the association's existing three-man operated, on-rail, two-unit detector cars, the new unit is a two-man operated, rubber-tired highway truck equipped with flanged guide wheels to permit the car to operate either on highways or railroad tracks. In addition, transistorized components have been used to miniaturize the testing equipment to enable it to fit into about one-tenth the space occupied by the equipment used in the on-rail cars.

The new unit, known as the Road-Rail test car, was developed in the Detector Car laboratory of the AAR's research center by H. W. Keevil, detector car engineer, and William Brazitis, development engineer. They reasoned that by miniaturizing the test equipment a rubber-tired truck could be used instead of the AAR two-unit, on-rail-type car being currently used. By equipping the

OPERATOR'S COMPARTMENT is located at rear of body where operator has unobstructed view of track being tested.





DRIVER'S position (above) includes a panel of switches and meters for controlling rail-testing power. Operator's compartment (below) has a panel of transistorized amplifiers and a recording table with 12 pens and 4-in paper tape.

ar has rubber tires

truck with flanged wheels the truck could move over the highway to the section of track to be tested, be placed on the track for the test run and then return to the highway for movement to the next section of track. This mobility reduces the time spent moving between test locations and also gives more on-track testing time since the truck clears trains at any convenient road crossing rather than traveling to the nearest siding. The mobility of the Road-Rail cars also enables faster and more direct movement between railroads. Space also is saved in a highway vehicle by eliminating sleeping quarters since the crew is able to drive to a motel or hotel for the night.

To date the AAR has completed three of the new cars and three additional cars are nearing completion. The first car was completed for the Great Northern a year ago. The second car is to be retained by the AAR for leasing to railroads. This unit became available for testing and demonstration purposes on April 25 and went into regular leasing service on June 14. The third car was completed for the Santa Fe and placed in service in May. Both the GN and Santa Fe also have contracted for one of the Road-Rail cars nearing completion and the remaining car will be retained by the AAR. In addition, five more cars are planned, all for interested railroads.

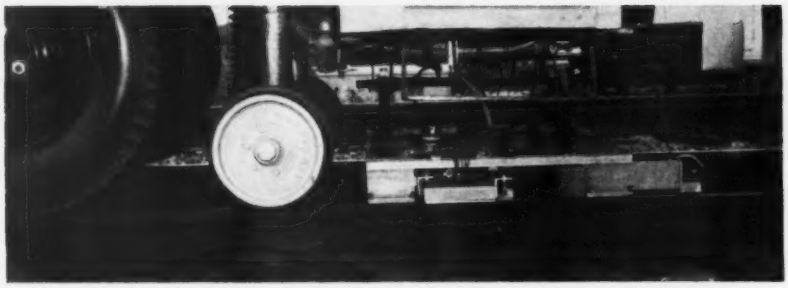
Commenting on the new detection equipment, G. M. Magee, director of engineering research for the AAR, stated that "developments to date with our new Road-Rail test car, are most encouraging from the standpoint of performance testing. We have every reason to believe this unit will do as good a job, perhaps even better, of detecting rail defects than our rail-type cars."

Mr. Magee pointed out that the relatively low cost of the new car, which is about $30,000, is much less than the investment in the association's rail-type cars. "I anticipate," he said, "that roads that would like to own and operate their own test units may find it desirable to do so since a unit can be obtained at this relatively low investment."

Photographs of the new detector car appearing with this article show the unit that was purchased by the Santa Fe. They are presented through the courtesy of that road.

The AAR research center does not sell these cars to railroads, but when a railroad desires to obtain one, arrangements are made by the railroad to obtain and deliver a suitable truck chassis and body to the research center where the electronic equipment is installed on a cost basis. The railroad is then licensed under AAR patents to use the detection equipment.

The Road-Rail car consists of a specially built aluminum body on



PICKUP CARRIAGE slides along rail on both Stellite and stainless-steel runners. Carriage includes a special pickup device for detecting vertical split heads.

'Miniaturized' test car cont'd

a Ford truck chassis which is powered by a 152-hp V-8 engine. The car is 22 ft long, 7 ft wide, 10 ft high and weighs less than 15,000 lb. It is equipped with 14-in cast steel guide wheels, power steering, power brakes, front-wheel drive and a standard four-speed transmission. The transmission has been augmented by a reverse gear box for providing high-speed operation in reverse. The car will operate on the rails at speeds up to 45 mph although when testing it usually maintains a speed of 5 to 10 mph. On the highway the truck can be operated as fast as speed limits permit. Other equipment on the car includes a Sparton "Superblast" horn, a rotating amber beacon on top of the body which is operated when the car is on the track, and rail brushes for activating block signals.

Each guide wheel supports 1000 lb when the vehicle is on the track. The remaining weight of the car is distributed to the four rubber tires which also operate on the rails.

Both men in the car's crew are qualified operators and take turns driving the vehicle and operating the test equipment. The operator's station is located in the center of the rear wall and includes a recording table, switches and a panel containing 12 amplifiers. The rear wall contains three windows which give the operator good visibility of the track being tested. Two 22-in swinging doors are provided adjacent to the operator's position and two 24-in sliding doors are provided for the driver. A buzzer system permits communication between driver and operator.

For the comfort of the crew, the walls and ceiling inside the body are lined and insulated. The floor is marine plywood which has been given a fiber-glass-reinforced surfacing coating. Heat is provided by two hot-water heating units. The body also contains locker space, a work bench and electric lights.

The new car utilizes the same residual magnetic system for testing rails that is used in the association's rail-type detector cars. In this system electro-magnets set up a magnetic force in the rails as the car moves along the track. In a rail without flaws this force dissipates as the car continues along the track. However, in a rail containing flaws the force in the rail dissipates but leaves a residual force in the defect. The residual force is cut by an induction coil mounted on a pickup device, which generates a signal. This signal is amplified and transmitted to the recording device on the operator's table at the rear of the car. The recording device consists of 12 pens, 6 for each rail, and a 4-in paper tape.

The system is designed to test the head area of rails for the entire length of the rail with the exception of 3 in at each end. Defects readily detected by the car include transverse and compound fissures, detail and engine-burn fractures and vertical and horizontal split heads. In addition, the car frequently will detect fillet cracks and bolt-hole cracks that extend into the head area.

On the new Road-Rail test cars there are two electro-magnets, one for each rail, located just behind the front tires under the chassis. In shape and size the magnets are specially designed to place the proper magnetic force in the rails and to leave the right amount of residual force when the car moves on. They are protected by an epoxy coating which insulates and waterproofs the coils. Each magnet is supported by a carriage which operates on the rails on two non-magnetic stainless-steel rollers.

How pickup units work

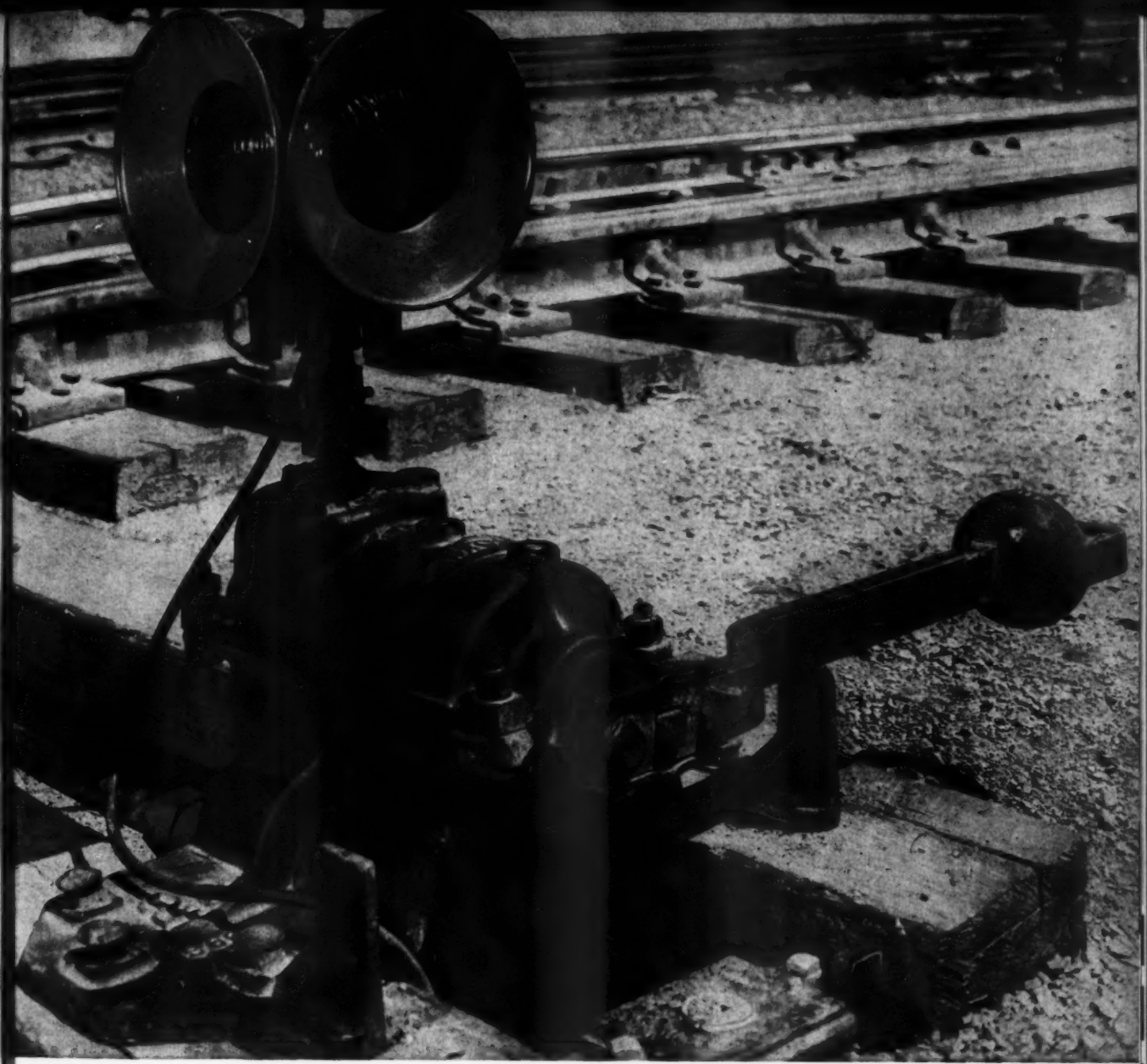
The carriages supporting the pickup units are located behind the rear guide wheels. Each carriage slides along the top surface of the rail on Stellite runners and along the gage side of the rail by means of stainless-steel runners. Both top and gage runners are kept in contact with the rail by means of springs. The main pickups are located at the front of the carriage. They rock from side to side to follow the contour of the rail. Another pickup, located on the gage side of the head, works in conjunction with one of the main pickups to screen out minor burns and surface blemishes.

An additional pickup device detects vertical split heads. It includes a U-shaped magnet which is positioned transversely of the rail. The purpose of this magnet is to rotate the residual field to enable the defect to be picked up by the VSH detector.

Both the magnet and pickup carriages, as well as the guide wheels, are raised and lowered hydraulically. In the raised position a minimum clearance of 12 in is provided.

It is interesting to note the result of the miniaturization of the test apparatus. For example, the on-rail detector cars have four large and one small electro-magnets for energizing the rails and two large cabinets of amplifiers. On the new car, there are only two magnets and a small panel of transistorized amplifiers.

The new Road-Rail car, like the on-rail cars, also has equipment for hand testing rails where the operator cannot see external evidence of a flaw detected by the car. The procedure used in hand-checking rails is the same as that used by the rail-type cars. The Road-Rail car, however, puts only 250 amps of electrical current into the rail whereas the rail-type cars use 1000 amps. This reduction in current required the AAR to use a special amplified meter to detect the voltage drop at a flaw.



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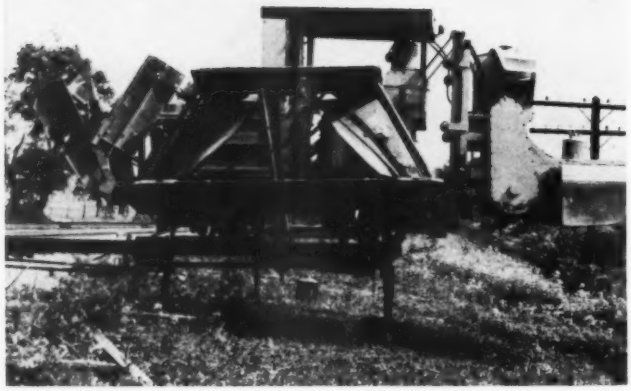

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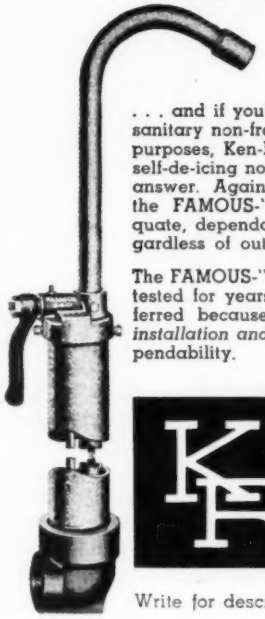

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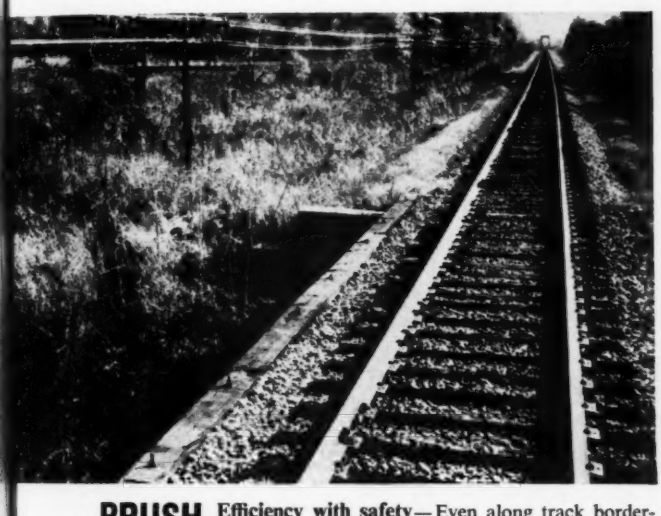

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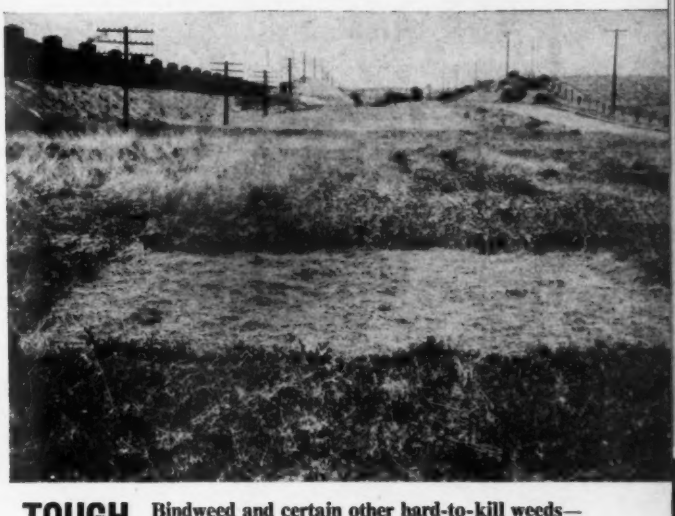

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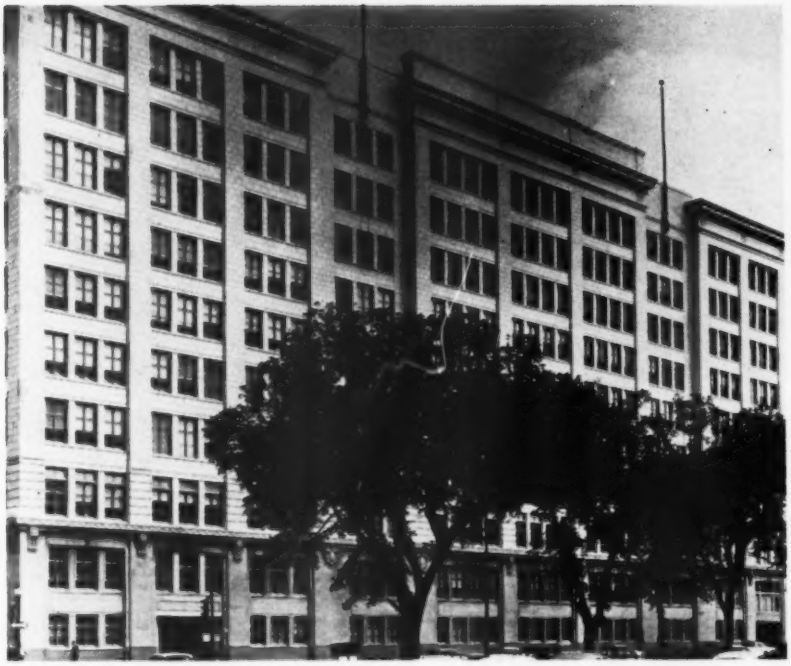


STANDARD steel units were used by the Santa Fe to replace the deteriorated wood windows in its block-long, ten-story office building at Topeka, Kan. Design of the steel units enabled two men to replace one window every two hours.

Big office building gets new steel windows

● Window replacement on a mass scale. That was the problem that recently confronted the Santa Fe at the general office building for its Eastern Lines in Topeka, Kan.

The building is 10 stories high and a block long. In its facade alone there are 383 window openings, with 694 window units. The sashes, sills and frames had deteriorated to the point where major repairs and replacements were necessary. As a result heat loss through the windows in winter was excessive and it was difficult to provide proper ventilation in summer. In addition, the paint on the wood surfaces was badly crazed, cracked and flaked.

The decision was made to replace the old windows with standard steel units, fabricated and painted in the plant of the manufacturer. The design selected includes channel-like members that fit over the old sills and frames, and are fastened with screws. Hence, it was necessary to remove only the old sashes and sash guides before installing the new windows. Largely due to this consideration it was possible for a team of two men to replace the windows at an average rate of a window every two hours.

The steel windows installed were manufactured by the F. C. Russell Company, Columbiana, Ohio. They are made of Armco Zincgrip steel with a baked-on enamel finish. The zinc coating, which protects the steel from corrosion, consists of a layer of zinc applied by a special continuous hot-dip process. It is reported not to flake or peel when the window parts are formed.

Advantages claimed for the new windows include steel frames which will not swell or warp with changes in weather and metal surfaces which are protected against corrosion even if the finish coat should chip. Also, the strength of the steel base guards against mechanical damage.

OLD wood sashes and sash guides were the only elements removed before new steel windows were installed.

CHANNEL-LIKE members were fitted over the old wood sills and frames. These were then fastened with screws.

NEW WINDOWS are made of Armco Zincgrip steel with a baked-on enamel finish. Steel base guards against damage.

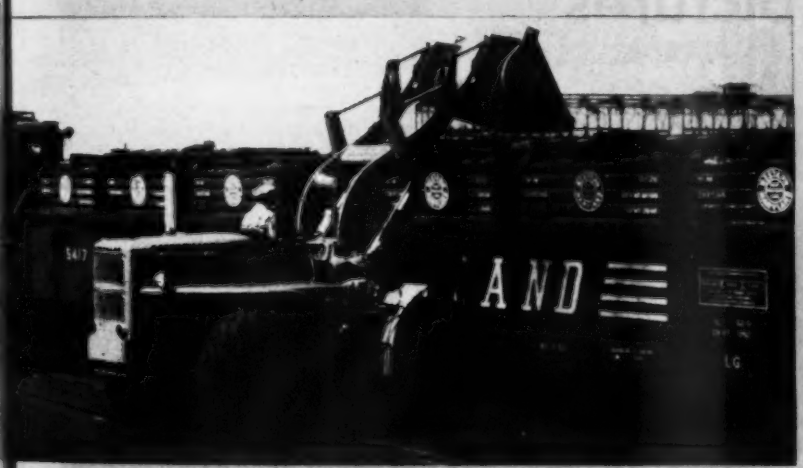
FILLS ORDERS FASTER WITH NEW TRAXCAVATOR

Western Maryland Railway Co. put a 944 Traxcavator on their heavy ore handling operations. The 2 yd., 105 HP Traxcavator loads hopper cars, double-row container cars, and small loaders handling ore inside box cars. Orders are filled faster, handling costs are cut.

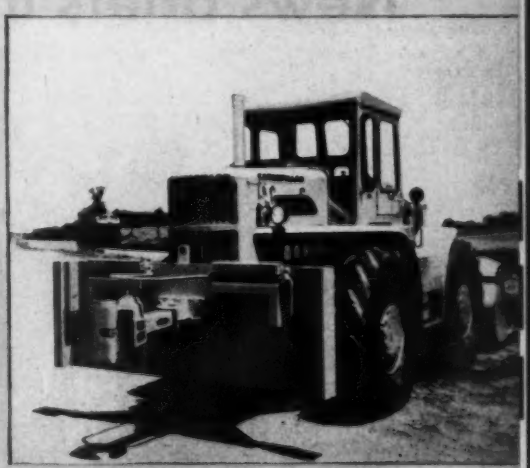
A Traxcavator can probably give you the same advantages in bulk material handling . . . speed and lower costs. The short time you spend learning about Traxcavator features can lead to a long, pleasantly profitable application. Consider the dependable Cat Diesel Engine that operates on locomotive diesel fuel (optional gasoline engine on two models) . . . Cat power shift transmission for finger-touch shifting of first and second, forward and reverse . . . power-boosted steering and dual brakes . . . exclusive automatic bucket controls that set the digging angle and lift and hold the bucket . . . wide-open design that puts lift arms safely in front of the operator, lets him get on and off easily, quickly, keeps his efficiency high.

Your Caterpillar Dealer has all the facts about the three wheel-type Traxcavators; the quicker you see him, the quicker you'll know *just how much* your material handling costs can be cut.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.



944 Wheel Traxcavator reaches into hopper cars and, with special bucket, loads double-row container cars from one side.



Special coupler attachment, provided by Cat Dealer, equips this 944 Traxcavator for car moving, as well as bulk loading.

CATERPILLAR

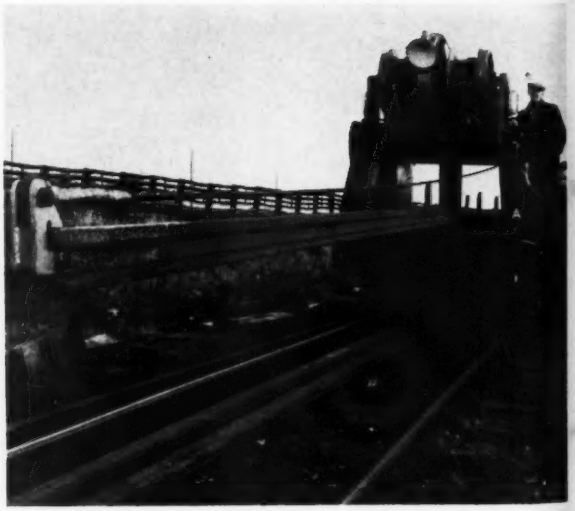
Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

Designed for piggyback operations

Although served at one end by four tracks for handling LCL freight, Santa Fe's newest freighthouse at Corwith yard, Chicago, was designed for 100-per cent piggyback operation. Leased to the Clipper Carloading Company, this 700-ft long structure has features for expediting this traffic, such as unobstructed platforms, wide eaves, rolling overhead doors, wide tailboard spottings, extra strong bumpers and a variable ground level for accommodating different trailer floor heights. Television cameras (below) keep the traffic manager informed of all platform operations. Spotlights beam brilliant illumination into every trailer being loaded.

News briefs in pictures . . .



Special train handles long welded rails

When replacing 300-ft welded rails, used on many sections of the London Underground system, with new rails, London Transport had to cut the old rails and load them piecemeal. To permit the old rail to be recovered intact for use elsewhere, the road constructed a special five-car train, which incorporates a power-winch loading apparatus and special car rollers and bolsters. The special train has a low deck in order to facilitate both the loading and unloading of long strings. The power winch, located at one end of the train, is used to lift the end of a string onto an end roller (left). The winch is then disconnected and a special guide-roller attachment is slipped on the rail end. The train is moved forward, pushing the rail on the train until all but the last 20 ft are aboard. The winch then pulls the remainder of the rail onto the rollers and bolsters of the cars (right). After as many as 18 rails are aboard, the load is pinned down by a clamping bar on the center car. Rails are off-loaded in the usual manner of securing one end of the rail to the track and pulling the train away.

PROVED

PLASSER & THEURER

(1) Spot Tamper KST 95

(2) High Speed Tamper VKR-03

(3) Streamlined VKR-03 FL Noise reduced

(4) Plassermatic 300 Universal Economy Tamper

(5) Plassermatic VKR-04 High Capacity Tamper

(6) Streamlined VKR-04 Spec. with self propelled front dolly

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THEURER

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ECONOMY

Make your choice from this unequaled complete range!

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2705, Marcel Street, Montreal 9, Quebec
Canada

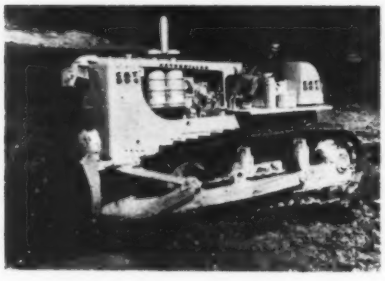
PRODUCTS

Remove old ties with . . .

New tie saw

EQUIPPED with two sabre-type saws, the new Kershaw dual tie saw cuts the tie inside each rail adjacent to the tie plates and removes the three pieces. The machine is operated by one man and is clamped to the tie while the tie is being cut. The two outside pieces of the cut tie are picked up by tie removers and dropped outside the track. The center section is removed from its bed and dropped between the rails for later removal by hand. Production of the new machine is claimed to be in excess of 100 ties per hour. *Kershaw Manufacturing Company, Dept. RTS, 2205 West Fairview Ave., Montgomery 1, Ala.*

(Circle 200 on TIME-SAVER card, page 39)



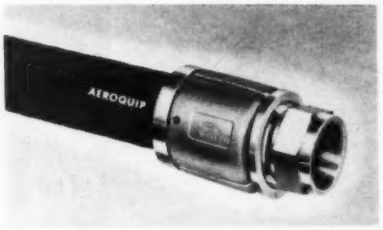
Increased power for . . .

Crawler tractor

THE NEW Caterpillar D9 Series G crawler tractor incorporates a 15 per cent increase in horsepower. In addition, it has an improved power-shift transmission, power train and final drives and a redesigned track roller frame. The power of the machine has been increased to 385 flywheel horsepower. This increase results primarily from a system of controlled turbocharging with aftercooling of intake air. The power-shift, torque-divider transmission combines a single-stage torque converter and planetary gear set to give the efficiency of direct drive and the anti-stall and torque multiplication of a torque converter. Three speeds in both forward and reverse are selected by a single "finger tip" shifting lever.

Three entirely new hydraulically boosted cable controls are available for the D9G, all with larger clutch, brake and drum capacities than previous models. In addition, three different hydraulic controls are available which provide nine separate arrangements of the controls. Attachments available for the new machine include the No. 9C cushioned bulldozer, a cushioned push block and the No. 9 ripper. *Caterpillar Tractor Company, Dept. RTS, Peoria, Ill.*

(Circle 201 on TIME-SAVER card, page 39)



For high-pressure lines . . .

Spiral wrap hose

DEVELOPED especially for large-diameter high-pressure hose lines, the new Aeroquip 2755 Spiral Wrap hose is claimed to be ideal for hydraulic systems requiring 1¼ to 2-in hoses with working pressures up to 3000 psi. The new hose consists of a synthetic inner tube with alternating layers of spiral wire wrapping and synthetic rubber. For use with the hose, special detachable and reusable segmented fittings have been developed which are designed to be assembled quickly and easily with simple hand tools. In addition, the hose need not be skived to attach the new fittings. The manufacturer claims that the segmented fittings are leakproof and blowoff proof. *Aeroquip Corporation, Dept. RTS, Jackson, Mich.*

(Circle 202 on TIME-SAVER card, page 39)

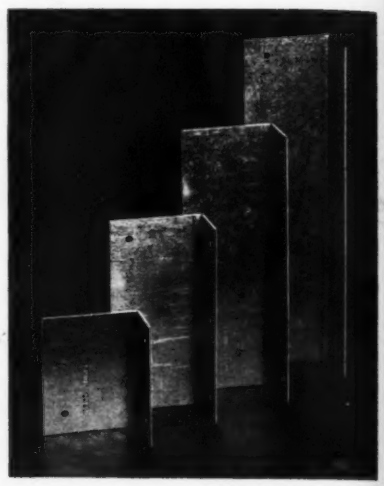
•

For wood connections . . .

Reinforcing angles

THE TECO line of timber connectors and framing devices has been expanded to include special reinforcing angles. Known as Teco Angles, they are manufactured from 16-gauge galvanized sheet steel in 3, 5, 7 and 9-in lengths. The angles are designed primarily for general utility use whenever wood-to-wood connections are involved, such as posts to beams and plates, beams to girders and solid blocking to plates, including locations where a transfer of seismic loads is desired. The new angles are claimed to develop the full value of nails in shear. Special 9-gauge 1½-in long nails are provided with each carton of angles. Each nail is stated to have a value of 156 lb. *Timber Engineering Company, Dept. RTS, 1319 Eighteenth St. N. W., Washington 6, D. C.*

(Circle 203 on TIME-SAVER card, page 39)



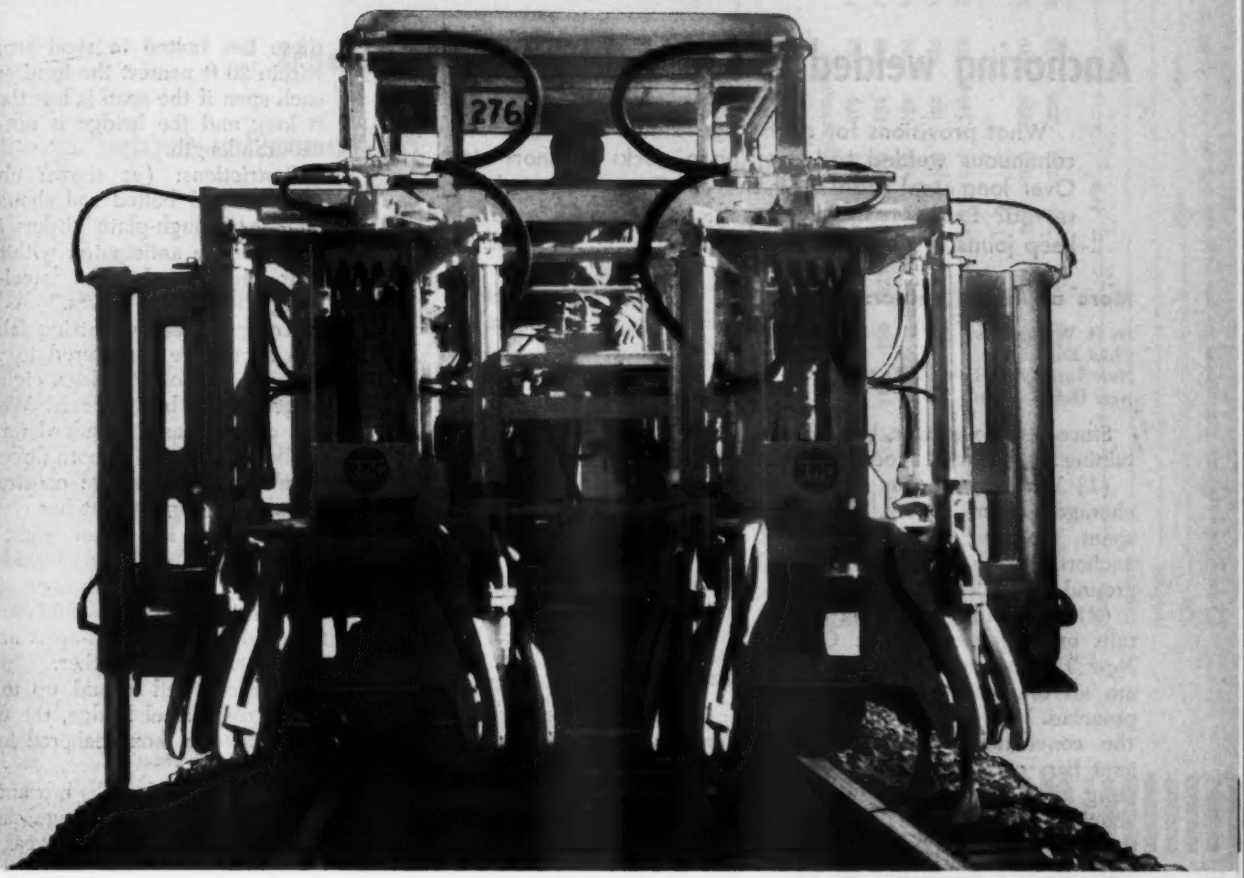
High or low lifts with . . .

Track jack

A NEW lightweight, high-capacity, aluminum track jack is available for making high or low lifts. Designated Model 717-BA, the new jack is 14 in high, weighs 36 lb and has a lifting capacity of 15 tons. It can be raised 7½ in. The jack is equipped with a 6½-in by 10¼-in base and a 1⅝-in-square rack. Foot lift height is 2 in. The Model 717-BA has a special aluminum alloy housing and a heat-treated steel socket lever. *Duff-Norton Company, Dept. RTS, Pittsburgh 22, Pa.*

(Circle 204 on TIME-SAVER card, page 39)

World's Most Versatile Tamper



McWilliams MULTI-PURPOSE 8

A PRODUCTION TAMPER

A SPOT TAMPER

A JACK TAMPER

With ballast compaction equal to the McWilliams Production Tamper, the machine tamps under the tie in sixteen positions—each tool tamping in two places. Speed in production tamping: up to 4 ties per minute. *As a Spot Tamper*, split head with integral jacks assures effective tamping of joints, low spots, switches and in yard and terminal work. *As a Combination Jack and Out-of-Face Tamper*, the machine will operate as a jack tamper in making out-of-face raises, finish tamping ties at jacking points. It then can go back and finish tamp the remaining ties —making possible out-of-face tamping with one machine, an operator and a foreman for sighting the raise. *Ask for details.*

Tools tamp in the same pattern as the McWilliams Production Tamper

Railway Maintenance Corporation

PITTSBURGH 30, PA.

Track Stays up Longer with a McWilliams Tamper

WHAT'S THE ANSWER

Anchoring welded rail on bridges

What provisions for anchorage should be made when laying continuous welded rail over open decks of short steel spans? Over long steel spans? What restrictions, if any, should be observed? Explain. Should the strings be specially fabricated to keep joints a specified distance away from such bridges?

More approach anchors

By H. W. Jenkins
Chief Engineer
New York, New Haven & Hartford
New Haven, Conn.

Since 1955, we have been maintaining the following procedure:

(1) We do not change our anchorage pattern over short steel spans. We use the same number of anchors on the open deck as on the ground adjacent to the bridges.

(2) Concerning anchoring welded rails on long steel spans: On the New Haven, our long steel spans are all drawbridges and their approaches. We have continued to use the conventional 39-ft rails with joint bars on these bridges, terminating the continuous welded rail about 30 ft (minimum) away from the bridge approaches and applying extra anchors within the last 250-ft section of the continuous welded rail.

We have experienced no difficulties in holding our welded rail by using the methods described above over the short steel spans, and it is our feeling that the extra anchorage within the final 250 ft of welded rail at our long spans has held the rail sufficiently secure.

Eight rails away

By S. H. Barlow
System Engineer of Track
Northern Pacific
St. Paul, Minn.

We use the following general rules for welded rail on bridges although, when special or unusual conditions prevail, they are referred to the bridge department for joint solution.

Short steel spans under 30 ft in length: Box anchor only those ties bolted to steel stringers.

Long steel spans: Box anchor those ties bolted to steel string within 20 ft nearest the fixed end each span if the span is less than ft long and the bridge is not o 210 ft in length.

Restrictions: (as shown abo Conventional bolted rail should laid on through-plate girders if renewals are anticipated within near future; also on steel-s bridges located on curves.

String fabrication: String fabr tion should be considered to pl conventional joints at least eight lengths from bridge ends. We this distance as a standard for anchoring each tie in both directi from a joint. A bridge construc of long steel spans that has conv tional joints less than eight lengths from it's end would crease the standard number of chorage applied. This would incre the tendency for a pull-apart at joint during cold weather.

If welded rail is laid up to not across a steel bridge, the w ed rail is then box anchored fo rail lengths.

The eight rail lengths box anc ed pertains to the trackage eas the Cascade mountains whereas six rail lengths box anchored required west of the Cascades.

(*Please turn to page 41*)

NEW QUESTIONS to be answered in November

Do you have an answer to any of the questions listed below? If so, send it in. Payment—based upon substance and length—will be made for each published answer. If you wish your name withheld, we'll gladly comply.

Deadline: September 29

• 1. The adoption of mechanized district gangs requires someone to make track inspections. Who should do this work? What should be his qualifications and how is he qualified? What should he look for? Should he do any corrective work himself? Explain.

• 2. How do you measure the clearances of tunnels on tangent track? On curved track? What other methods can be used? Explain. What equipment or instruments are required?

• 3. Where a few long ties have failed under a frog located in a turnout with tracks on each side, what should be done? Is there any easy way to renew these long ties? Explain.

• 4. If a high truck load strikes a short (25-ft) girder span over a highway and causes the lower flange of the main girder to buckle upwards 3 in over a length of 3 ft near the center of the span, and also tears the ⅞-in flange at one end as far back as the toe of the main angle, should traffic be barred from this span or be allowed pass under a slow order? Wha the best method for repairing damage? Explain.

• 5. The installation of a switch stand and connecting rod new headblock ties is an art. scribe step by step how this sh be done.

Send answers to:

What's the Answer Editor
Railway Track & Structures
79 West Monroe Street
Chicago 3, Illinois

Do you have a question you'd lik have answered in these columns? I please send it in.

TIME-SAVER READER SERVICE

Use these cards ➧

- **For product information**
- **For free literature**

Check over the items below and on the other side of this page. They refer to products described or advertised in this issue, or to free literature offered by manufacturers. If you desire additional information about any of the products, or copies of the literature, circle the corresponding numbers on one of the cards, and drop it in the mail after typing or printing your name, etc. With one card you can get information on all the items listed.

Products offered by advertisers

100. Ballast-Type Electric Snow Melters—Says units attain 284 deg in 15 min. (Page 2)

101. Tubular-Type Electric Snow Melters—Attached to stock rail adjacent to switch point. (Page 2)

102. New Century Switch Stand—Says unit is easy to adjust or to relocate. (Page 3)

103. Jackson Track Maintainer—Offers information on this production tamper. (Page 4)

104. Armco Bin-Type Retaining Walls—Deep-corrugated steel cells protect right of way. (Page 6)

105. Track Welding—Offers services and equipment for all maintenance-of-way welding. (Page 7)

106. Ajax Water Service—Gives information on drinking water service for work crews. (Page 8)

107. Track Maintenance Equipment—Points out that the Nordberg line of "Mechanical Muscles" for track-maintenance operations includes more than 30 machines. These units are described and illustrated in Bulletin 293. (Page 9)

108. Ureabor 31—New granular combination of three weed killers for dry application. (Page 11)

109. Ureabor 62—Chemically the same as Ureabor 31 but is double strength. (Page 11)

110. Model PB-B Weed Burner—Trailer-type unit can burn a swath up to 25 ft wide. (Page 12)

111. Power Bridge Tools—Describes Fairmont line of hydraulically operated units. (Page 14)

112. Fairmont Bolt Puller—Hydraulic unit for pulling drift bolts from open-deck trestles. (Page 14)

113. Bridge Spike Puller—Has 8-in stroke for removing track spikes from trestles. (Page 14)

114. Fairmont Deck Jack—Lifts one side of deck to facilitate renewing stringers. (Page 14)

115. Fairmont Chord Mover—Shifts chords of trestle to permit driving new piles. (Page 14)

116. Single-Pump Power Unit—Portable unit provides power for operating hydraulic tools. (Page 14)

117. Multiple-Pump Power Unit—Operates up to 4 different hydraulic tools at same time. (Page 14)

118. Fairmont Hydraulic Impact Wrench—Unit is designed to either loosen or tighten nuts. (Page 14)

119. Fairmont Hydraulic Drill—Unit is designed to handle full range of bit sizes. (Page 14)

120. Fairmont Hydraulic Chain Saws—Available in 20-in and 30-in models. (Page 14)

121. Model MC Rail and Flange Lubricators—Points out features of these units. (Page 17)

RAILWAY TRACK & STRUCTURES August, 19

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145	146	147	148	149	150	151	152	153	154	155	156	157	158
160	161	162	163	164	165	166	167	168	169	170	171	172	173

Items described in Product Section:

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TIME-SAVER Reader Service cont'd

122. Racor No. 22 Switch Stand—Designed to be run-through to speed up yard switching. (Page 29)

123. TPC Set-Offs—Portable units can be set up ready for operation by two men in 10 min. (Page 30)

124. Tool and Supply Car—Tubular steel unit weighs 140 lb and has a capacity of 2000 lb. (Page 30)

125. Ken-Ray Model 840 Hydrant—Points out features of self-de-icing, non-freeze unit. (Page 30)

126. Weed and Brush Killers—Offers services for planning complete control programs. (Page 31)

127. "Karmex" Diuron Weed Killer—Says material gives one-application control of weeds. (Page 31)

128. "Telvar" Monuron Weed Killer—Can be used in combination with "Karmex" diuron. (Page 31)

129. "Ammate" Weed and Brush Killer—Says can be used near highly sensitive crops. (Page 31)

130. "Dybar" Fenuron Weed and Brush Killer—Comes in easy-to-use pellets. (Page 31)

131. "Trysben" 200 Weed Killer—For use on bindweed and other hard-to-kill weeds. (Page 31)

132. Model 944 Traxcavator—Wheel-type unit has a 2-cu yd bucket. (Page 33)

133. Plasser Tampers—Shows units available, including one with self-propelled front dolly. (Page 35)

134. McWilliams Multi-Purpose 8 Tamper—Can be used as a production, spot or jack tamper. (Page 37)

135. Rail Grinding Service—Contract arrangement obviates need for capital investment. (Page 41)

136. Racine Two-Rail Tamper—Says "Oct-A-Gun" unit will tamp up to 180 ties per hour. (Page 43)

137. Racine One-Rail Tamper—Designed to tamp at the same rate as two-rail unit. (Page 43)

138. Ka-Mo Model H140 Hydraulic Boring Unit—Describes use for preboring pile holes. (Page 45)

139. In-Place Treatment of Piles—Offers service for prolonging life of wood bridges. (Page 46)

140. Compression Rail Anchor—Says units provide uniform holding power in both directions. (Page 47)

141. Burro Crane—Unit is offered for doing jobs on the line or in yards. (Page 48)

142. Model 40 Burro Crane Ditcher—Has long digging radius for ditching and loading cars. (Page 48)

143. Railway Spring Washers—Designed to ease stress and strain in track bolts. (Inside back cover)

144. Model D8H Tractor—Power shift transmission enables shifting without clutching. (Back cover)

Free literature offered in advertisements

145. Woolery Weed Burner—Folder 170 gives information on Model PB-B machine. (Page 12)

146. Graco Maintenance Equipment—Offers catalogs on painting, lubricating units and pumps. (Page 41)

147. Ka-Mo Earth Drills—Offers bulletin on drills and drilling technique. (Page 45)

Other free literature offered by manufacturers

148. Jordan Spreaders, Ditchers and Snowplows—Folder describes and illustrates hydraulic powered units. It points out features and advantages of machines and shows typical applications. *O. F. Jordan Company, Inc.*

149. Maintenance Guide—A 72-page manual is available which describes the Gulf Trouble-Free Maintenance Plan and gives information on vehicle servicing and lubrication. Lubrication charts and record forms are included. *Gulf Oil Corp.*

150. Concrete Mixtures—Tenth edition of 68-page booklet entitled "Design and Control of Concrete Mixtures" is available. Booklet includes information on materials, mixing, placing, curing and finishing. *Portland Cement Association.*

151. Tie Treatment—Brochure gives data on treating ties with pentachlorophenol. *Chapman Chemical Co.*

152. Plate-Type Roof Trusses—Design booklet gives details on new trusses. *Timber Engineering Co.*

153. Industrial Hoists—Catalog 600 describes Coffing line of hoists. *Duff-Norton Company.*

154. Hose Fittings—Bulletin 651 describes Iron Mike 3-component fittings. *Aeroquip Corporation.*

Items described in Product Section

200. Dual Tie Saws—Cuts tie inside each rail and removes the three pieces from the bed. (Page 36)

201. Crawler Tractor—Model D9G has 15 per cent increase in power, other improvements. (Page 36)

202. Spiral Wrap Hose—Developed for large-diameter high-pressure hose lines. (Page 36)

203. Reinforcing Angles—Develops full value of nails in shear in wood connections. (Page 36)

204. Track Jack—Model 717-BA designed for making both high and low lifts. (Page 36)

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Spot surfacing after track raise

Is it necessary to spot surface and line track after it has been reballasted and raised from 1 to 3 in? If so, why and when should this be done? Explain. Is it necessary to do this after a higher raise? Why?

Usually not necessary

By C. I. Hartsell
Division Engineer
Chesapeake & Ohio
Saginaw, Mich.

Generally speaking it is unnecessary to spot surface track after a track raise of from one to three inches as such a raise usually corrects the low-joint condition which necessitated the track-surfacing project. Naturally a track must be lined after each raise.

The above statement must be qualified to the extent that, with bent rail conditions, it will be necessary to go over the track again with either a "smoothing" or "jointing" operation. Careful tamping of the joint ties will eventually result in bending the rail back and straightening it up. This can be done if experienced manpower is available with adequate tamping tools. Badly bent rails, of course, will have to be replaced with good quality rail. The statement on correcting bent rail applies only to the rails that have the lesser bends.

Track that is reballasted and raised higher than 3 in must necessarily be "smoothed" or "jointed." The timing of this "smoothing" or "jointing" depends entirely upon traffic conditions. Heavy traffic lines naturally will be "knocked down" much faster than the lighter traffic lines. Each supervisor and foreman is fairly familiar with his own particular rail and ballast conditions and should be in position to judge the timing of the "smoothing" or "jointing" operations.

Influenced by rail

By L. G. Lawson
Roadmaster
Canadian National
Melville, Sask.

When track has been ballasted and raised one to three inches there is very little need of a spot surface following the lift. However, the condition of the rail and surface of the track prior to the lift has a great bearing on this.

In cold climates where the ballasting and lift has been done before the frost is entirely out of the ground, there is always a danger that frost heaves are not completely out. This should be watched carefully and in most cases a spot lift is necessary.

Also, rails that have been neglected and are bent due to low joints need spot lifting several times be-

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Our contract arrangement for these services obviates the necessity for any capital investment on the part of the Railroads and protects them as to cost for this type of work.
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fore a satisfactory surface is obtained. This also applies to locations where the joints are extremely low; a spot lift some time later is almost a necessity.

We have done a lot of 1-to-3-in-lift work during the past five years. When doing this work we mark the low joints and give them additional time with the tamper. All joints are given additional tamping but the real low ones are given even more. In spite of this, the joints that were very low will go down a little and will require at least one spot lift. On track that has been kept in good surface, this additional work is not necessary.

On a lift over 3 in, settlement will leave the track in need of a spot lift later on. I recommend that this work be done within a month of the lift, otherwise bent rails will result due to poor surface. Loose joints in the track also tend to make the joints go down after an out-of-face lift.

Ballast curbs on bridges

How high can curbs be built up on ballasted-deck bridges for making track raises without having the curbs tip out? When tipping does occur, what should be done? Explain.

Anchor the curbs

By R. N. Wagnon
Engineer of Structures
Missouri-Kansas-Texas
Denison, Tex.

In areas where a raise in grade will also affect a timber ballasted-deck bridge, consideration must be given to at least two methods of economically accomplishing the raise on the bridge.

The first of these methods could be achieved by the addition of extra timbers to the existing timber curb wall. If the raise is not too great, this method would certainly be the easiest to perform and perhaps the cheapest since all work would be on the top side of the structure.

On our railroad we standardize with curbs 12 in high, consisting of three 4-in by 8-in timbers. However, it is our opinion that curbs may be built to a maximum of 2 ft high above deck level before any serious tipping and problematic maintenance will occur.

With the ballast-raising procedure we must also view the effects of the additional dead weight upon an already standardized structure. The addition of more ballast must not impair the load-carrying capacity of the structure while trying to accomplish the grade raise by a seemingly more economical method. It is our belief this may introduce trouble and be less economical in the long run.

When the raise is made by the addition of curb timbers and tipping of leaning does occur, this can be remedied by placing inside braces, anchoring the curb to the decking at various intervals, or by the addition of steel straps or angles on the outside at each cap location designed to counteract the induced lateral pressure.

Briefly, the second method of compensating for a grade raise on a timber bridge would be to alter the substructure by shimming or double capping the bents, thus leaving the static dead load on the stringers unaltered.

Removing weeds under bridges

Some roads scalp all vegetation from the ground surface under bridges; some use soil sterilants for this purpose. What are the advantages of this practice? How far should the bare area extend from center line of track? Explain.

Uses two methods

By J. M. Erickson
Supervisor B&B
Wabash
Montpelier, Ohio

On the Montpelier division of the Wabash, it used to be the practice to scuff all vegetation from under bridges and around backwalls by the hand method. However we now have a program of applying weed killer each year by two different methods.

Method No. 1: We use a powder-form weed killer and spread it under bridges and around wood backwalls, favoring the area near the wood bents and backwalls.

Method No. 2: Each year we have a program for applying liquid-form weed killer with pressure equipment over a portion of the right of way. While covering this territory all weedy areas under bridges and around wood backwalls are sprayed.

Both methods prove very satisfactory.

As to the distance covered from centerline of track: Our practice is to cover the ground at least 20 ft from the center line of track. We also cover a distance of at least 10 ft around wood backwalls.

Savings are large

By D. L. Wilhite
Technical Sales, Railroads
Agricultural Chemical Sales
U. S. Borax & Chemical Corp.
Chicago

With the present cost of labor it is not economically feasible to scalp vegetation. With roads that employ the hand-scalping methods, it would be necessary to scalp at least two or perhaps three times a year. This, of course, depends upon the type of vegetation, soil type and amount of rainfall. When the scalping method is used over a number of years, there is a possiblity of creating a small ridge at the edge of the scalped

area. This ridge consists of dead vegetation and layers of top soil deposited by work crews while scalping the bridges. The ridge tends to hold an excessive amount of water and prohibits adequate drainage, therefore inducing the growth of vegetation.

Railroads that have adopted the use of a soil sterilant found that they have reduced their labor and maintenance expenditures by two thirds the cost previously paid for hand scalping. It is only necessary to make one application per year. When the chemical is applied as a pre-emergent, the vegetation is eliminated and no fire hazard occurs.

The bare area should extend for about 15 to 25 ft from the center of track. The determining factor is the type of vegetation growing outside the treated area. For example, for vegetation ranging from 6 to 24 in. in height, about 15 to 20 ft from the center of the track should be treated. Rank vegetation from 2 to 6 ft high calls for treating 25 ft or more from the center of track.

Economies are obvious

By D. H. Yazell
Assistant Engineer
Illinois Central
Chicago

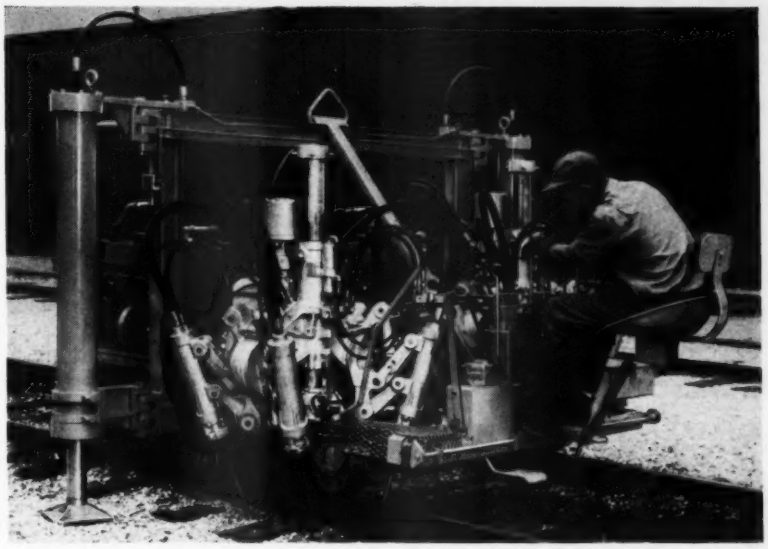
I am a little surprised to find that some railroads are still scalping vegetation from the ground surface under bridges as the question here intimates. The economies involved in the use of soil sterilants are so outstanding over the hand method of scalping that it is really difficult to understand why anyone should still be shovel cutting.

AREA Committee No. 22, subcommittee report on Assignment No. 4 for September, 1960, reported the scalping method as costing $655 per acre. The soil-sterilant method, including chemical and application, cost only $220 per acre. Need anything else be written about this?

Besides the obvious economies, there are two other advantages:

(1) Fewer men are tied up doing non-productive work when chemicals are used. There is now a machine available which will even aid in reducing the manhours spent in applying granular herbicides underneath bridges.

(2) The soil-sterilant method will



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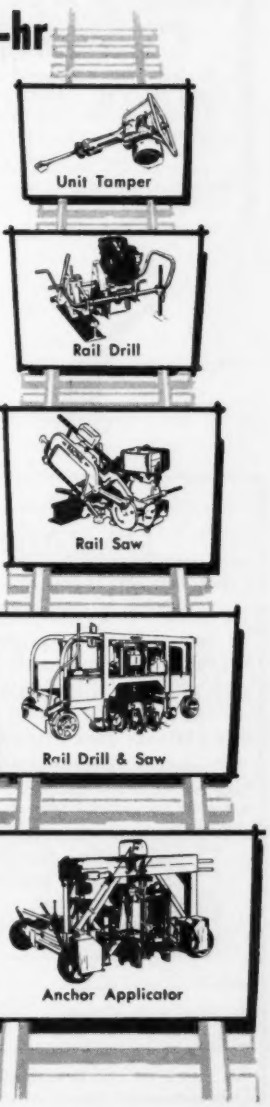

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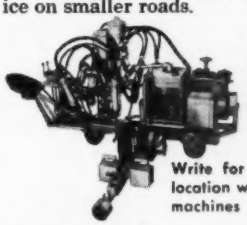

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RACINE

What's the answer? (cont'd)

leave the ground in a bare condition for longer periods, hence providing greater fire protection than the scalping method. It is necessary to scalp at least two times a year, and in southern areas even three or four times are necessary, to maintain complete bare ground.

The bare areas should extend approximately 16 to 25 ft from the center of the track, depending on the type of vegetation in the adjacent areas and the amount of right of way available for clearing. If the vegetation is in general low-growing grasses and weeds, the bare area need only be 16 ft from the center line of the track. If the vegetation is tall-growing, even 25 ft in some instances would not be far enough. It is good practice, when such higher types of vegetation are growing adjacent to a treated area, to cut them at least once a year. In the event that higher-growing types of vegetation are present and it is a practice to cut it, only 16 ft from center of track is necessary.

None of these methods are 100 per cent foolproof. In rare instances and in special cases where vegetation is tall, prevailing winds and gullies cause channeling of air currents. I can recall one instance where we had no vegetation growing closer than 75 ft from the track when a strong wind, blowing through burning dead willow trees, blew burning embers onto a bridge and destroyed it. It is not always economical to guard against these very special cases.

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Unit change-outs on machines

Some roads make unit change-outs of large assemblies on roadway machines in the field. What assemblies or parts lend themselves to this practice? What are the advantages? Disadvantages? Explain. Who should do this work?

Not feasible

By R. M. Johnson
Supervisor Work Equipment—System
Western Maryland
Cumberland, Md.

The change-out method of large assemblies on railway machines in the field is being done on some railroads in the United States. We feel that this is a matter than can be discussed at great length, due to the amount of equipment that a railroad has.

Most railroads do not have sufficient machines of any one model. They may buy a few pieces one year and continue to do this for a number of years. As we all know, manufacturers improve their machines from year to year. Hence, when field change-out units are installed, you are upgrading as well as making many major changes to the equipment.

In doing this, it is wise to do it in a shop where you can set up a standard for upgrading these unit assemblies. This may involve the rebuilding and reinforcing of the frames, drilling of new holes in frames for the change-out units, and many other items.

We feel that the unit change-out system is not feasible, except on those railroads where the location is such that the equipment can be used the year around. Under such circumstances, this could seem to be a matter of expediency, rather than economy.

The railroads in the North operate the majority of their track equipment five to six months out of the year. During the remainder of the year the work of improving, or upgrading of equipment, as some call it, should be done.

This can be done in a shop where the necessary parts are available and where the men are out of the weather. In many places the unit exchange has been used, and there have been cases where the necessary bolts, nuts or parts were not available when they needed them on a Saturday or Sunday, when most of the unit-exchange work is done.

With the unit-exchange system in the field, you must have a truck with a crane and, you might say, a small complete workshop to do the necessary work on the parent unit.

The majority of the railroads cannot afford to have these extra assemblies for the machines. By the time you buy the parts for the unit-exchange assembly, you have as much money, if not more, invested in parts as you would have by buying a complete machine, plus the investment of the above-mentioned truck. We believe, therefore, that an extra machine would be more

feasible than the unit-exchange system, due to economy.

On the majority of railroads, the mechanics or roadway repairmen are hourly-paid men. Therefore, you will be getting into time-and-one-half or double time for the week-end work. In most cases, they would spend as much if not more time in traveling from the main shop or headquarters to the machine to be worked on. This is another added expense for the unit-exchange system.

On some railroads the mechanics or roadway repairmen are salaried. Therefore, this does not enter into the cost of the unit-exchange system. But, in the overall picture, the men are hourly paid.

The unit exchange of small engines and cylinders has been in use for a number of years. But, this was true on smaller machines which were used by the section gangs of past years. The replacement of a small engine can be handled by one man during working hours. But, the unit exchange of large assemblies is done on week ends when the machine is not used on track work.

The majority of the tie-and-surfacing gangs now are about the size of the old yard-gang forces, and range from 20 to 30 men. In most cases, if they do use a machine the year around, there is enough work for the gang to do, or the vacations of this gang can be so arranged that the gang would be down for a couple of weeks, while the equipment is returned to a central point to be worked on.

We can see no advantage of unit exchange on large assemblies due to the large expenditure in a double stock of parts and the complete unit-exchange truck. To us, this is a disadvantage because, first, we do not have the men and, second, management will not allot us the money as we cannot justify the expenditure.

Includes large units

By J. W. Mueller
Superintendent M/W Shop
New York Central
Jackson, Mich.

With the advent of mechanization of maintenance work and ever-increasing inventory of equipment, and to prevent down-time of this equipment through mechanical failures under extreme work conditions,

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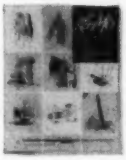

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What's the answer? (cont'd)

it is necessary that shop-repaired units be available for delivery and installation in the various types of equipment.

Types of such units can be construed as complete engines, including transmissions, drive shafts, forward and reverse transmissions; hydraulic drive-coupling assemblies; wheel and axle assemblies; sprocket and jack-shaft assemblies; other units; compressors; and boom assemblies, depending upon the type of equipment.

Units may be disbursed by best train service available, by truck pick-up from the field, or by unit-repair truck from the base shop. The advantage of the latter system is faster repair service, complete installation and prompt return of the defective units for repair. This point is most important as it prevents other equipment from being down for lack of repaired units.

Is a necessity

By V. W. Oswalt
Superintendent, Maintenance Equipment
Central of Georgia
Macon, Ga.

The changeout of various units on roadway machines in the field has been the practice of several railroads, particularly those operating in the southern part of the country where the roadway machines are operated the entire year. Such a long operating season does not allow for the shopping of equipment, therefore, a well organized program of unit changeouts in the field is a necessity.

Such assemblies as the following very readily lend themselves to the above practice:

(1) Power units, diesel and gasoline, complete with radiator; power take-off; electrical starting and ignition systems; and air, fuel and oil filters. These units should be made ready for installation after a thorough break-in and equipped with lifting bails for safe handling.

(2) Transmission and propelling assemblies, air or hydraulically operated. These assemblies should be thoroughly tested prior to installation.

(3) Gear reduction assemblies, with air or hydraulic motors installed and tested prior to installation on machine, for driving conveyors, flexible rams, chain assemblies, crawlers, etc.

(4) Axle assemblies for various types of machines complete with bearings, wheels sprockets, etc.

(5) Wings, plows and brooms on Ballast Regulators, complete with cutting edges, and broom engines with mounted drive assembly.

(6) Air compressors complete with engine and necessary attachments to make it a complete independent unit. This should be tested, adjusted and ready for installation.

(7) Many other unit assemblies, such as tamping heads, scarifiers, hydraulic and air pumps, motors and cylinders, can be made up into unit packages for quick changeouts in the field.

The major advantages of unit changeouts in the field are: Reduction of machinery down-time, increase in overall production, increase in preventive maintenance, and close coordination between roadway mechanics and shop forces due to constructive criticism of units received and installed in the field. All of these lead to good performance.

The elimination of expensive standby machines more than offsets the cost of the original purchase of spare unit assemblies. The number of spare units is governed by the number of machines in service. The frequency of changeouts is controlled by preventive maintenance, daily maintenance and predetermined unit service life.

The size of the changeout force is governed by the type of unit being handled. A shop mechanic can deliver the units to the site, assist the roadway mechanic and possibly one member of the operating field force, if necessary, to make the changeout during a weekend tieup.

A highway truck of about two-ton capacity, or a larger outfit, such as a tractor truck and flat-bed trailer, and a small five-ton crane with sufficient boom length mounted on the vehicle will enable the forces to deliver and install the new unit, and to remove and return the old unit to the shops.

Correction

In the June issue it was incorrectly stated that Bondarc VI, a two-part epoxy formulation for bonding joint bars to rails, is manufactured by the Rail Joint Company. The manufacturer is the Armstrong Cork Company. The Rail Joint Company is the distributor in the railroad field for this formulation and others manufactured specifically for railroad use by Armstrong Cork.

Minimizes down-time

By A. O. Griffin, Jr.
Supervisor Roadway Machines & Welding
St. Louis Southwestern
Pine Bluff, Ark.

The manufacturers who are designing their machines with the view of building the working components into compact assemblies are really on the right track in advancing their machines and simplifying the field maintenance. Today, the costs are too high for transporting parts that require shop facilities for making repairs. When breakdowns that require from field-to-shop handling for repairs do occur, then the field operation is stopped or hampered causing lost production. Generally, this practice requires the same number of men but it makes the cost higher for less production.

The assembly changeout is the quickest way to restore full production. Generally, it is only a matter of taking out a few bolts, setting the changeout assembly in, replacing the bolts and the machine is back in business.

Association news

Plans made for Roadmasters', B&B banquet in September

Another outstanding banquet is being planned for members of the Roadmasters' Association and the American Railway Bridge & Building Association who attend the annual meetings of these associations in September. This information comes from officers of the Association of Track and Structure Suppliers which sponsors this annual event for the members of the two associations and their families.

Details of the banquet, which will be held at the Conrad Hilton hotel, Chicago, on September 19, the second day of the three-day concurrent conventions, were worked out at a recent meeting of the Executive Committee of the AT&SS at Chicago. The method of assigning tables that has been in effect for several years will be continued this year, according to R. T. Johnson, Jr., president of the suppliers' group. Under this system, two of the ten seats at each banquet table are occupied by representatives of supply companies who act as hosts to the railroaders present, explained Mr. Johnson.

Roadmasters' Association; Bridge & Building Association

The annual concurrent conventions of these associations will be held at the Conrad Hilton hotel, Chicago, September 18-20. Detailed schedules of both the joint and separate sessions will be published in the September issue. A skeleton program follows:

Sunday, September 17

1:30 pm—5:00 pm—Registration, Astoria room

Monday, September 18

10:00 am—12:00 noon—Joint Session
- Greetings from representatives of other associations
- Address on "Transportation policies and their effects on maintenance-of-way programs," by C. E. Bertrand, vice president, operations and maintenance, Baltimore & Ohio
- Address on "Progress under changing conditions," by T. B. Hutcheson, chief engineer, Seaboard Air Line

2:00 pm—4:30 pm—Both associations will hold separate sessions

Tuesday, September 19

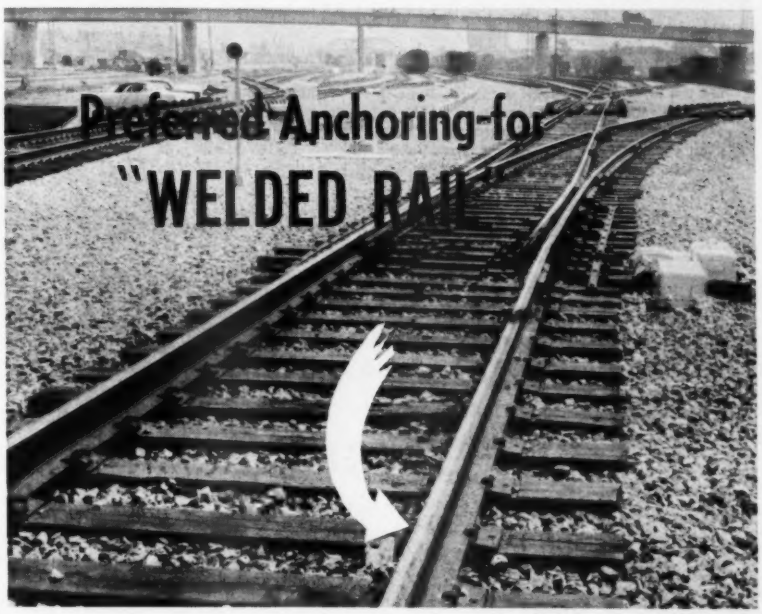
9:30 am—12:00 noon—Joint session
- Address by Wayne A. Johnston, president, Illinois Central
- Address on "Where to now in maintenance-of-way and structures," by J. P. Hiltz, vice president, operations and maintenance, Delaware & Hudson
- Moving picture in color showing construction of Santa Fe's 44-mile line change in Arizona

2:00 pm—4:00 pm—Both associations will hold separate sessions

6:30 pm—Annual banquet sponsored by Association of Track & Structure Suppliers

Wednesday, September 20

9:30—12:00 noon—Associations will hold separate sessions, including election and installation of officers



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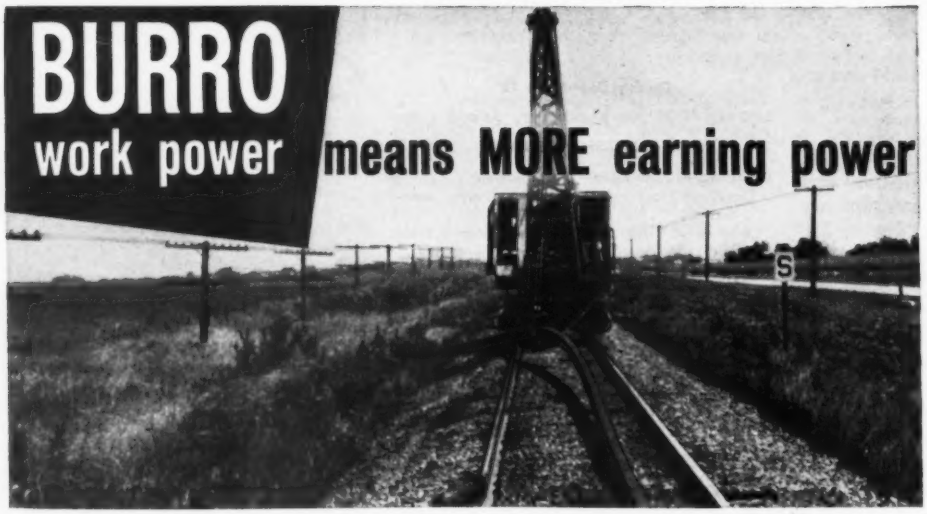

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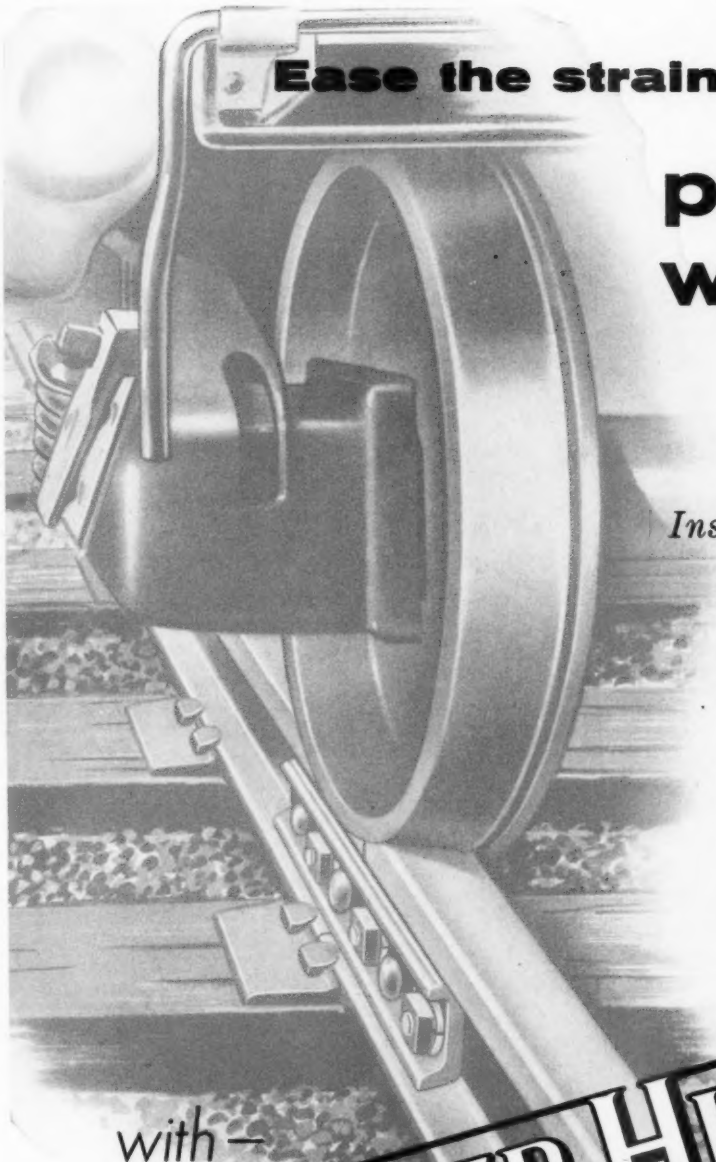

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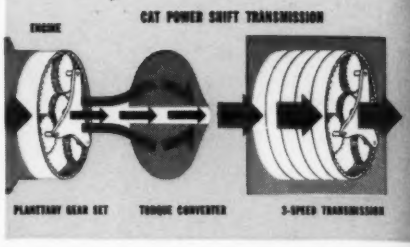

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Your present equipment may move material at low cost—but here's one reason a D8 Series H Tractor may move it a lot cheaper.

It's the Caterpillar power shift transmission—the only transmission available that combines the advantages of direct drive, torque converter drive and power shifting in a single unit. It greatly increases operator efficiency—offers important new opportunities for broadening your production margin.

Here's how this big step ahead in transmission design helps your operator get more work from the machine: A single selector lever replaces the familiar master clutch, gear change and forward-reverse levers. Using this single selector lever, the operator can shift on the go in a split-second even under full load. He changes speed or reverses direction with finger-tip ease . . . without clutching . . . without braking . . . without even lifting his arm from the arm rest. And the lever is mounted for left-hand control, leaving the right hand free for maneuvering the tractor or controlling the dozer, ripper or scraper. Convenience makes it easy to choose the right speed at the right moment.

Matching this ease of control are safety features you'll like. A safety lock in the selector housing holds a parked machine in neutral while the engine is running. Another safety device automatically shifts the selector lever to neutral when the engine is stopped.

The simplicity and safety of the Cat power shift transmission make your good operators even better and less experienced operators more effective. They can take greater advantage of the tractor's power and capacity to speed the work. And ease of operation keeps their efficiency high throughout the day.

Cat power shift transmission also means a big jump in your machine's efficiency too. You'll particularly notice the difference on jobs where frequent shifting is the rule—such applications as feeding a shovel or short-cycle dozing.

For instance, in dozing, the operator starts to pick up the load in second gear—then shifts on the go to first for full lug yardage. There's no clutching, no lost time or momentum when changing speeds. An easy move back to second drifts the material to its destination. Another move of the lever puts the machine in high-speed reverse for fast return to the digging area.

Machine efficiency is *always* high. Cat power shift transmission provides the needed power at the highest possible speed. Its exclusive torque divider design combines the snap and economy of direct drive with the load-matching ability and anti-stall characteristics of torque converter drive—and three forward-reverse speeds tailor it to the entire working range.

Just how much of an increase will the Cat power shift transmission make on your job? This will depend on your application. On short-cycle dozing, reports in our file show increases *as high as 50%* over similar-sized machines with other transmissions. Some users flatly state they will never buy another track-type machine in the 200 HP class unless it is a Cat power shift unit.

Power shift transmission is just one reason the D8H may be a far better production tool than any machine you are now using. There are other features of this 235 HP turbocharged tractor that could be equally advantageous in your work. Your Caterpillar Dealer will welcome the opportunity to discuss the D8H in terms of your job and present facts and figures so you can determine true benefits. And if a demonstration with measured results would help, he will be glad to make arrangements.

Call him today.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

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STEP UP PRODUCTION WITH CAT POWER SHIFT TRANSMISSION